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The Grid and Reconstruction

Contribution to Industrial Expansion

IN the reports of the Central Electricity Board for 1940-43 which were released for publication early last year and dealt with by us at the time, the outstanding feature was the proof given of the indispensable part that was played by the electricity supply system of this country in the war. In its Report for 1945, reviewed in this issue, the focus is shifted to national rehabilitation. For the grid to achieve its purpose in the latter respect, a much greater proportionate number of kW must be made available for every employed person at a price that will permit industry here to compete on favourable terms with that of other countries.

Plant Production and Maintenance

As a first essential to availability, there must be a very considerable increase in the allocation of labour to the manufacture of generating plant which was held up by war priorities and to the constructing of power stations. This applies also to the maintenance of existing plant in power stations and its repair at manufacturers' works. At the time of the peak in both of the two past winters more than 1,600,000 kW, representing a capital value of nearly £50 million, was idle mainly owing to lack of men for this work. Moreover, the prolonging of the maintenance period so that it trenches upon the periods of heaviest demand has itself been the cause of load restriction. Assuming the present labour difficulties to be surmounted, there still remains the prospect of delays in securing statutory consents to the erection of the necessary new stations and the speeding up of present procedure should receive the immediate attention of the authorities.

Full availability of supply will also depend upon more regular deliveries of coal, deficiencies in which have nearly put important stations out of action at critical times. Account must also be taken of reduction in boiler capacity and efficiency owing to incombustible matter and varying quality of coal with its secondary effect of increasing the number of men required for maintenance and operation as well as adding to transport and handling charges.

In regard to future costs of electricity, by far the greatest factor in cheapening production would be a very substantial reduction in the price of coal, which should be related to its heat value and the general demand for fuel of like quality. An increase of more than 125 per cent in fuel costs per kWh sent out since 1938, to speak moderately, is not an encouragement to wider industrial electrification.

Planning to Meet Change-over Conditions

During the war the ability of the Board to cope with urgent needs was based upon previous planning that was of a sufficiently flexible character to permit of adaptation to emergency conditions as they arose. Similar skill will doubtless be called for—perhaps for several years—in meeting the exigencies of the change-over to normal working and in liquidating the legacies of the war. At the same time provision will have to be made for meeting a demand that can be expected in the near future to resume the pre-war rate of growth. The

new grid tariff has been devised, by adjusting yearly surpluses and deficits over a five-year budgetary period, to allow a slight reduction in bulk-supply charges during the reconstruction period, despite the higher capital cost per kW of new plant. That appears to be as good a contribution as the Board is able, on its own, to make. It is now up to other authorities to do their share.

Tax Relief

THIS country's financial position is not such as to encourage really significant cuts in taxation and the reductions announced by the Chancellor of the Exchequer last week were, we suppose, as much as could be expected. The abolition of E.P.T. will be generally welcomed, but raptures are modified by a doubt regarding a possible alternative. The further income tax reliefs do not amount to a great deal although put over with clever showmanship. The remission or reduction of purchase tax seems to have been a little arbitrary; why, for instance, should hair-waving appliances have been included and irons and washing machines ignored? One good point is the allowance of income tax relief on employers' capital contributions to technical colleges which their employees attend.

Nationalized Industries

IN our issue of February 8th we commented on an article in the *Spectator* by Wing Commander Geoffrey Cooper, M.P., criticizing the Central Electricity Board—unfairly we thought—as a bad example of what may happen under public ownership. It would seem that Wing Commander Cooper's views, albeit based on incorrect assumptions, arose from his undoubted anxiety to ensure that nationalization shall not result in inefficiency and stultification of enterprise. This is clear from memoranda which he has now sent us upon the activities of an independent committee of business men and M.P.s of which he is chairman.

No State Capitalism

IF nationalization is inevitable, the principles enunciated by the Committee should be accepted. The Committee does not want to see a nationalized industry develop into some form of State capitalism with a Minister as virtual dictator. Plans for the application of business methods should be drawn up by qualified men. Democratic methods of control must comply with highly-efficient business practice, avoiding the dead hand of bureaucracy and red-tape civil service procedure. We have said that these principles should be accepted, but there is little guarantee that they will be, even though methods of reorganizing the Civil Service are expected to be dealt with by Wing Commander Cooper's Committee in due course.

The Adelaide Company

QUICKLY after the rejection of the first Bill for the acquisition of the Adelaide Electric Supply Co.'s undertaking, the South Australian Government has passed another similar measure. The prices to be paid to the shareholders (in Australian currency) are the Stock Exchange valuations at August 1st last year, but it has been contended by the company, with reason, that this is inequitable. Normally the Stock Exchange value, based on the dividends paid, does not reflect the true value of the ordinary shares, but the position is worsened by the fact that the price of the shares has been statutorily "pegged" at a low level. As regards the preference shareholders, it has been pointed out that while in the event of winding up they are entitled only to the par value of their shares, many of them acquired their holdings at a higher price and are entitled to some compensation. This compensation, however, should come from Government funds, not from the ordinary shareholders.

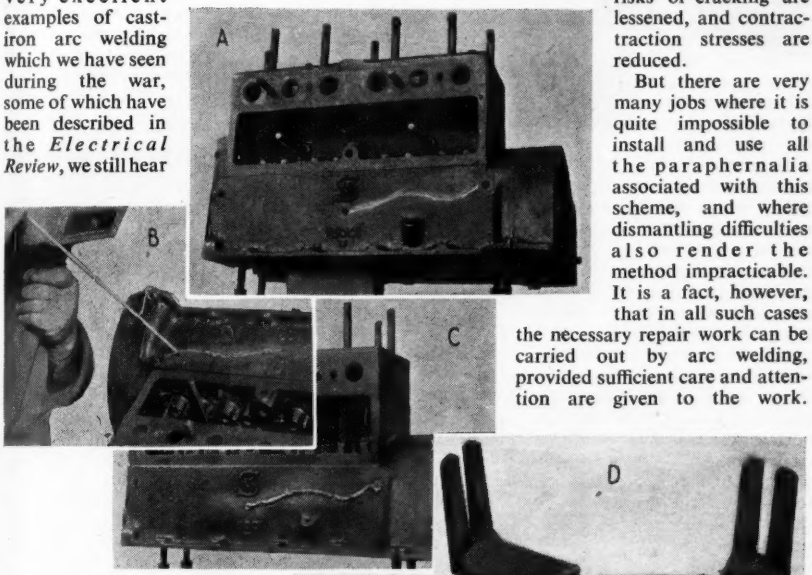
Arbitration Refused

ALL of the company's 5 per cent. "A" preference shares and a small block of ordinary shares are held in England and carry the right to payment of dividends free of British income tax. The South Australian Government proposes to pay only the same compensation for these as for the Australian-held shares and, moreover, to pay it in Australian currency. The Adelaide Company has maintained that the equitable and usual method of assessing compensation is by arbitration. A proposal to refer differences between the company and the proposed Electricity Trust to arbitration was, however, rejected.

Cast-Iron Welding

Some Practical Electric-Arc Demonstrations

THERE is still much controversy among engineers and others regarding the possibilities of welding cast-iron by the electric arc method. Indeed, despite some very excellent examples of cast-iron arc welding which we have seen during the war, some of which have been described in the *Electrical Review*, we still hear within and outside the electrical industry expressions of disbelief in the possibilities of welding cast-iron at all.



These and the following series of illustrations show processes and methods in the welding of cast-iron referred to in this article

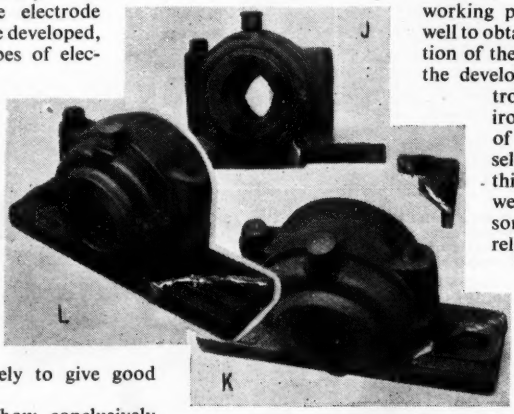
So far as we can ascertain, however, it is generally accepted by electrical, welding and other engineers that the only satisfactory way of welding cast-iron is by the oxy-acetylene method in a process cycle of pre-heating, welding and normalizing. We are quite prepared to concede that this probably constitutes the most reliable method of welding cast-iron, for we cannot imagine any disagreement with the idea that if castings are pre-heated to 300 deg C, hard zones are avoided, the risks of cracking are lessened, and contractraction stresses are reduced.

But there are very many jobs where it is quite impossible to install and use all the paraphernalia associated with this scheme, and where dismantling difficulties also render the method impracticable. It is a fact, however, that in all such cases the necessary repair work can be carried out by arc welding, provided sufficient care and attention are given to the work. Incidentally, the result is often a considerable saving in time and expense over the oxy-acetylene method, which it is certainly not our purpose to condemn.

If we may speculate a little, we suggest that the persistent disbelief in the welding of cast-iron was due to a bad start well before the war, and that this bad start had some of its roots in certain cases of "beginners' luck," where very satisfactory

welds were obtained by the arc method without knowledge of what was really happening. Then came the failures consequent on such ignorance, and with them the lack of faith, bias and prejudice which were certain to result from such disappointment following the great promise of success.

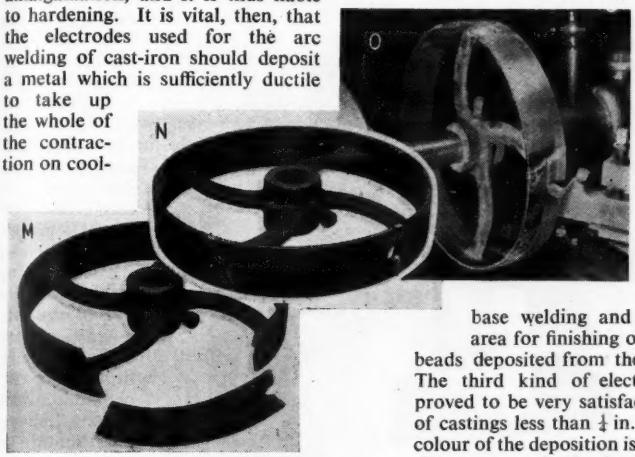
It now seems fairly safe to say that the "beginners' luck" resulted from somewhat chance selections of electrodes which happened to suit the particular grades of cast-iron being welded. Probably an ideal set of conditions would exist if all cast-iron was produced to one specification only and electrodes were made to the same analysis; but with so many varying grades of castings it is obviously impossible to provide electrodes with the exact analysis of every type. The electrode manufacturers have developed, however, three types of electrodes, which will satisfactorily cover all the requirements in the welding of good quality cast-iron. A word of warning at this point is that to-day many castings of inferior quality are produced which are not likely to give good welding results.



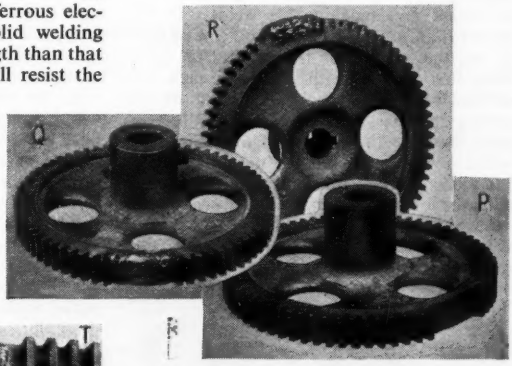
Our effort to show conclusively that there are now no real difficulties in the welding of cast-iron, and that it is a development which should be fostered by the electrical industry, really started nearly two years ago when Mr. K. H. Walden, welding engineer, Buck & Hickman, Ltd., was kind enough to render us a personal service by repairing one of the cast-iron side members of our lawn mower, and at the same time afforded us an excellent demonstration of how a casting can be successfully arc welded. We well remember the care with which Mr. Walden prevented over-heating, firstly by welding a short run here, and a short run there, and allowed considerable cooling time between the runs to avoid the setting up of stresses in the casting, and how with this in mind we were extremely anxious when we had to chip some of the deposition metal away in order to reassemble the mower. Following that rough usage, however, the casting has stood up well to two summers' normal garden use, with the result that we have sought further co-operation from Mr. Walden who made arrangements for us actually to see the welding work conducted on all the specimens shown in the accompanying illustrations.

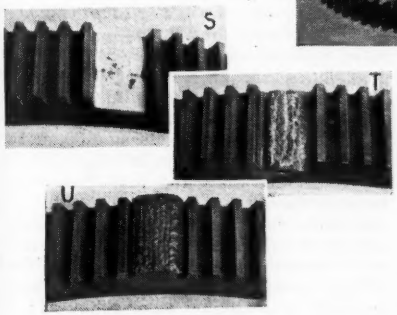
Before dealing with working procedures it is well to obtain an appreciation of the importance of the development of electrodes for cast-iron welding, and of their proper selection, and in this connection we must know something of the relationship between these electrodes and the cast-iron. Owing to the high proportion of carbon in cast-iron, the greater part of which is in the form of graphite, the metal is very brittle and very low in tensile strength. These qualities have a very important bearing on the considerations in mind, because they render the arc welding of cast-iron an entirely different proposition from the welding of steel which has a much higher tensility. During welding the heat-affected parts of the casting change to white iron, which is very hard and brittle,

and the steel deposited on this consequently becomes a carbon steel by the normal amalgamation, and it is thus liable to hardening. It is vital, then, that the electrodes used for the arc welding of cast-iron should deposit a metal which is sufficiently ductile to take up the whole of the contraction on cooling, thus avoiding fracturing of the casting adjacent to the welding points.



Three types of electrodes have been developed for the work. The ferrous electrode deposits a tough and solid welding material of a greater tensile strength than that of the cast-iron itself, and it will resist the contractional stresses which occur during casting repair work. Generally, however, the deposit from the ferrous electrode is not easily machinable, but it can be ground should this finish be suitable. The non-ferrous electrode deposits a welding material which is more easily machinable, and if two or more beads are deposited the result is a soft fusion zone. As the non-ferrous electrodes are much more expensive than the steel ones, the best and most economical procedure, in cases where there is a large area requiring to be repaired and also where final machining is called for, is to use the ferrous electrode for the base welding and to leave sufficient area for finishing off with two welding beads deposited from the non-ferrous type. The third kind of electrode, bronze, has proved to be very satisfactory for the repair of castings less than $\frac{1}{4}$ in. thick, provided the colour of the deposition is of no consequence. The success of this electrode is largely due to the fact that the melting point of bronze is considerably lower than that of steel,

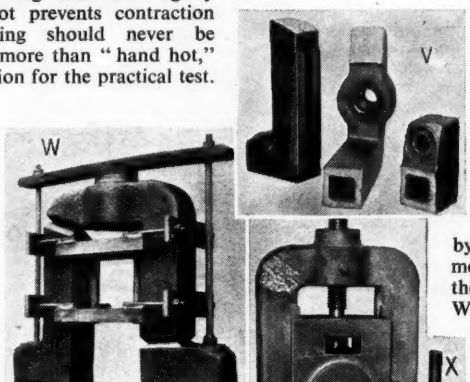




with the result that a lower current setting is permissible.

By comparison with other methods of welding cast-iron the importance of all the points in procedure is emphasized, and we suggest a golden rule of four in this connection, namely, cleanliness, lowest possible current, peening (wire brushing) while hot, and even distribution of heat. The fractures and other parts to be welded should be thoroughly cleared of all grease, oil and rust, before welding, and well descaled and peened

after each run has been made. The lowest possible current should be used in order to keep the stresses and penetration down to the minimum. Peening each run lightly whilst it is still hot prevents contraction stresses. The casting should never be allowed to become more than "hand hot," a very good expression for the practical test. This can be achieved by staggering the runs, i.e., depositing a run of, say, only 2 in. in one part of the casting at a time, and waiting for each run to become evenly distributed and cooled before commencing the next intermittent weld.



Whether or not a repair is required to be machined broadly classifies the welding under two headings, reinforcement and machineable welds. In the former, reinforcement deposition can be built up on the surface of the casting, a "V" being first formed, with a wall on each side of the fracture to about one-third of the casting thickness, the channel thus formed being then filled in with a bridging weld.

For a weld in which the deposited metal has to be subsequently machined or ground by lathe or planing machine, down to the surface level of the casting, a U-shaped groove is cut out over the fracture and the sides are first built up before the actual connecting weld is made. Ferrous electrodes are first used, leaving space for the top few runs by non-ferrous electrodes to afford the necessary machinability of the welded part.

The repaired side member of a lawn mower which inspired these investigations

Both of these methods are applicable to the repairs of cracks in, say, cylinder blocks or castings up to ¼ in. thick. A small hole should be drilled at each end of the crack to prevent its spreading, and welding can then proceed either on the U-groove principle or by the reinforcing method according to the type of the job. Where castings are completely broken into two or more pieces great importance should be attached to bevelling of the edges of the fractures, so that when the parts are assembled a V-cut is formed at the fracture. This is built up by one of the methods described, according to the finish that is required.

In the case of heavy and large castings where pieces are lost or large areas have to be filled in with deposited metal, studding is highly recommended. The studs are tapped into the walls of the casting where the repair is required, in staggered rows on either side of the fracture, and they should be inserted to various depths, so as to spread the contractional pull over the greatest possible space. The studs are able to "give" a little as the deposited metal contracts, and cracking possibilities are thereby reduced. The protruding portion of the stud should not exceed the stud diameter, and the pitch should be about six times the stud diameter.

Welding should first take place around the studs, and staggered runs then made between the various studs until, finally, the connecting runs can be made. The major part of the weld of this nature should be done with ferrous electrodes, the weld being finished off with non-ferrous deposit if machining is required. For castings from about ⅛ in. to 1 in. thick studs of $\frac{3}{16}$ in. diameter are recommended; the overall result is additional mechanical strength to the completed weld.

With regard to the specimen repair jobs which we actually saw carried out with normal commercial electrodes specially constructed for cast-iron welding, and with d.c. supplies from normal commercial welding equipments, the accompanying photographs which were taken during the work depict the almost infinite variety of work which can be tackled, and show many of the procedure points referred to. In the instance of the automobile crank case (photographs A, B and C), the method of grooving out the crack, terminating at two holes, is illustrated, as are the staggering and reinforcing welding. Grinding or machining is unnecessary for this particular job, and the extra deposition left on the surface imparts additional strength.

The cast-iron bracket (photographs D, E and F) and the slide bracket (photographs G, H and I) both illustrate repairs where parts are completely severed, the principle of staggering, and, in the case of the ordinary bracket, grinding down of a finished weld. Similar jobs may be unsuitable for grinding, but only because a grinding wheel cannot be manipulated satisfactorily.

The corner repair of the shaft bearing housing (photographs J, K and L) is a good example of a reinforcement weld. The broken pulley wheel (photographs M, N and O) clearly depicts the "machinability" welding after the build up at the fractures. On the inside of the pulley rim a ferrous weld projection is left for strength. The small and large gear wheels (photographs P, Q and R, and S, T and U) typify examples of filling in by deposition where pieces are lost, and show the method of building up the layers, with intermediate peening.

Photographs V, W and X depict similarly, in three stages, a very heavy repair job—the movable and bearing frame of a plate-bending rolling machine which was broken in three pieces. One leg of the frame is constructed of 4-in. square solid section cast-iron, and the other leg of ¾-in. thick cast-iron walls forming a 4-in. square hollow section. The breaks were vee'd and chambered all round, and the pieces were held in a special jig during the welding process. Before the welding was actually started, however, eight studs were inserted on either side of the solid section. The finished job has given great satisfaction.

Steel Furnaces

Coreless Induction Type

CORELESS induction furnaces for steel melting are the subject of a paper by MR. M. J. MARCHBANKS (Metropolitan-Vickers Electrical Co., Ltd.) presented to the Installations Section of the Institution of Electrical Engineers.

The author does not describe a complete installation; instead he discusses the functions and operation of certain parts of the whole which have been improved in recent years. He explains the way in which a furnace, body and coil insulation, can be constructed to avoid heating the metal framework and also deals with the fritting *in situ* of the refractory linings.

Rotary high-frequency generators are described, both homopolar and heteropolar types; there is little to choose between them for melting metal, but the latter responds more quickly than the former to rapid voltage changes that have to be made for certain kinds of heat treatment. The function of condensers and methods of switching them are discussed in relation to reactance and voltage regulation; also protection, which differs, although the same current is carried by series condenser and generator.

Variation of the physical properties of a charge during a melt are explained as well as the effects of lining erosion; also the development of earth-leakage protection for minimizing the damage that is caused when molten steel breaks through the refractory lining of the coil as well as for reducing the shock risk to operatives when stirring the charge with metal rods.

The paper concludes with brief references to the conditions to be fulfilled for the case-hardening of steel and to furnaces energized by thermionic valve generators, which are not so "efficient" as rotary machines and have so far not been made of such large power.

Census Taking by Electricity

IN a new method of census taking advocated by Mr. John P. Mandeville, an electrical engineer, in an address to the Royal Statistical Society last week, ordinary script, written in certain positions, would be scrutinized by a photo-electric cell, in a similar way to that by which punched cards are now checked by a machine.

Views on the News

Reflections on Current Topics

THERE now seems to be hope of early connection for all those on the G.P.O.'s list of would-be telephone subscribers. According to the Assistant Postmaster-General installations are now being put in at the rate of 50,000 a month; as the waiting list numbers 300,000 it is easy to calculate that in six months these arrears will be cleared off. Of course in that time applications will continue to pour in but the pace is being speeded up and one day service may be available on demand. The Post Office is to be commended for the way in which it is overcoming the difficulties brought about by the war.

* * *

A few weeks ago I referred to the hostility towards the existing organization of electricity supply aroused in a would-be consumer in a rural area as a result of maladroit handling by the undertaking unable to give the supply he required. But indifference, as reported to me by an urban dweller, is just as bad. Before moving in to a flat recently he advised both electricity and gas undertakings, asking the former whether it could supply current for some electrical appliances he already had. Simultaneously with the arrival of the furniture van came a tactful representative of the gas company. The response of the municipality was a letter demanding a deposit and an application form for lighting "as before." No interest was shown in any further possibilities and no reply was made to the request for information. My informant had lived for some years in the area of a power company whose attitude to consumers was, he said, very different.

* * *

Although I understand that the price which the Ministry of Supply is to pay manufacturers for the refrigerators for the temporary houses has not yet been definitely fixed, I believe I shall not be far wrong if I say that it will be somewhere between £15 and £16. As other prices I have so far heard definitely quoted for post-war refrigerators have been from £39 10s. for a 2·2-cu ft model up to as much as £94 for a 5·2-cu ft unit, this seems a very low figure and I should imagine there would be an overwhelming demand if units were to be made available to the general public at that price. It must be remembered, however, that the refrigerators for the temporary houses are designed to form a component of the complete kitchen/bathroom assembly. Accordingly no cabinet-work is required and the cost is correspondingly lower than it would be for a standard model. Also the capacity (just over 3 cu ft) is a little below that which those who already have refrigerators generally regard as the minimum desirable (4–6 cu ft).

* * *

However that may be, the cost of manufacturing a refrigerator does not increase proportionally to its capacity and there are now good prospects of a really first-class model of ample capacity being placed on the market in the not too distant future at a price which will bring the apparatus right out of the "luxury" into the "necessity" class. In any case, in considering the matter it must be borne in mind that the prices now being quoted by manufacturers for standard models are based on conditions as they exist to-day, with production by no means having yet got into its swing. Improvements in the labour situation and in the supply of such components as motors would enable production to be stepped up to a figure which would make substantial cuts in prices possible.

* * *

A proposal for freezing on a somewhat larger scale has been put forward in France where Monsieur Jacques Duclaux, speaking before the Academy of Sciences, suggested the accumulation of water in glaciers as a means of safeguarding against loss of hydraulic power in exceptionally dry seasons. He said that it should be possible to develop and encourage the reappearance of glaciers at many points on the gently inclined plateaux approaching 3,000 metres.

* * *

Empirical methods have been used in industry with great success for a great many years but scientific testing is likely to give more consistent results. Besides reliance upon the human factor has its limitations. At the recent F.B.I. Industry and Research conference Mr. A. Healey (Dunlop's) said that in the rubber industry experienced foremen used to determine the quality of their products by biting them and pressing them with a pencil. "After a period of some twenty years of close study, and particularly of the development of new testing methods, it was still the case that by biting and pressing with a pencil a very accurate gauge of quality was made. The real difficulties, however, with this kind of test are that opinions vary as between biters and pressers and their knowledge can only with difficulty be transmitted to the large number of inspectors and testers required in modern industry, and that biters may unfortunately lose their teeth."—**REFLECTOR.**

Central Electricity Board

Report for 1945

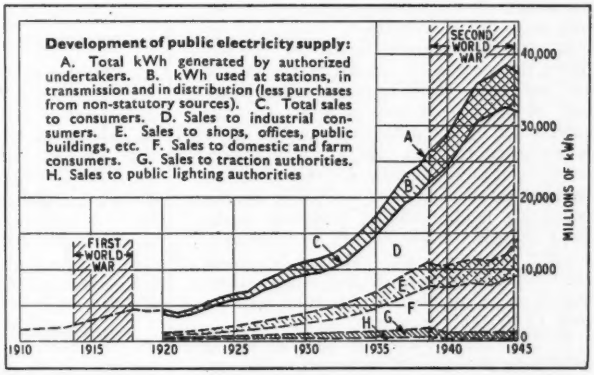
IN an introductory paragraph to the Eighteenth Annual Report of the Central Electricity Board it is stated that the Board is directing its energies to overcoming the difficulties of transition from war to peace so that the grid may contribute to national rehabilitation as effectively as it did in the prosecution of the war. Last year 37,276 million kWh was generated at public supply stations in Great Britain, 2·8 per cent less than the highest recorded figure of 38,356 million in 1944 but 53 per cent more than in 1938. All except 1 per cent of electricity supplied, excluding North Scotland, was produced in 193 stations (including 51 non-selected stations) operated under the directions of the Board. The total installed capacity at the end of December in the 142 selected stations (including the new Mexborough station of the Y.E.P. Co.) was 11,315,931 kW, a net increase of 61,850 kW over the previous year.

In May of last year the Board arranged for the manufacture of 1,612,500 kW for meeting the load up to 1948–49. This was in addition to 1,633,700 kW outstanding from previously authorized programmes for plant intended to be commissioned in 1944, 1946 and 1947. A further programme for 1,373,000 kW for completion in 1949 was drawn up. The progress in construction of this 4,619,200 kW of plant is, however, behind schedule on account of labour shortage.

Arrangements were made during the year with the following undertakings for the installation of generating sets of the kW capacity stated:—Glasgow (Braehead), two 50,000; North Eastern E.S. Co. (Dunston), two 50,000; (North Tees), two 60,000; Birkenhead (Bromborough), two 50,000; Sheffield (Neepsend), one 50,000; Birmingham (Princes), two 50,000; Leicester (Freeman's Meadow), one 30,000; Nottingham (North Wilford), one 50,000; Croydon (Beddington), one 50,000; Kingston, two 30,000; London Power Co. (Battersea), one 60,000; South Metropolitan Co. (Blackwall Point), three 30,000 ; and Cornwall E.P. Co. (Hayle), one 20,000. Including five house sets aggregating 16,500 kW, the total was 946,500 kW. In association with these are forty boilers with a total evaporative capacity of 12,030,000 lb per hr of which twenty-four are of 300,000 lb and above, five being of 400,000 lb.

Eighteen new stations are included in the programmes, one for 1946, three for 1947, six for 1948 and eight for 1949. Suitable sites are not easily found with essential features in combination, and the consequences of delays in obtaining consents and in satisfying the frequently divergent views of bodies concerned with town and country planning are likely to be serious. The hope is expressed that discussions now taking place may lead to the adoption of a simpler and more rapid procedure.

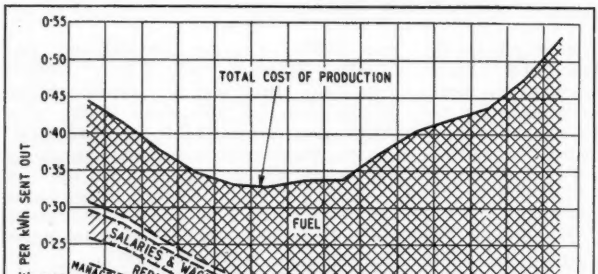
At the end of the year the grid comprised 5,158 miles of transmission lines (3,626 miles at 132 kV) and 349 switching and transforming stations having an aggregate transformer capacity of 13,646,150 kVA. Of the 554 distributing undertakings in the country (excluding North Scotland) 223 were supplied directly by the Board and 310 indirectly.



Depletion of coal stocks caused great anxiety. By mid-April they had fallen to two million tons or an average of less than

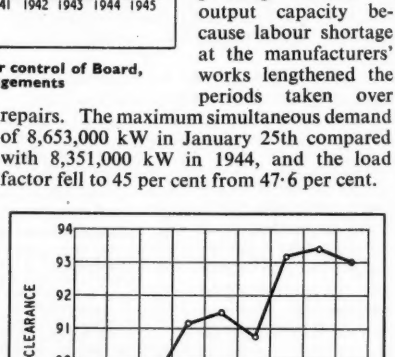
four weeks' supply, while some stations had less than one week's needs. The summer build-up brought the total reserve to only 3,200,000 tons, compared with 3,860,000 in 1943. Unsuitable quality of coal reduced boiler capacity by nearly 350,000 kW on occasions. In 1944 (the latest year for which particulars are available) more than 1,500,000 tons had a dry ash content exceeding 22·5 per cent delivered—twelve times the pre-war figure, the average ash content having risen to 13·2 per cent from 10·3 per cent. Rail transport of the 660,000 tons of ashes and dirt represented by this percentage increase alone is estimated to have cost about £185,000, handling at power stations £50,000 more and its final disposal another £200,000, besides occupying land. Adding £900,000 as the fixed charges on 300,000-kW of generating plant "sterilized" and allowing for lower efficiency (and hence higher fuel consumption) and increased maintenance, the total becomes over £2,000,000 per annum.

In 1945 the average cost of coal at the generating stations had increased to 43s. 4d. per ton as against 20s. 3d. in 1938. Although return to peacetime conditions and the bringing into operation of newer plant slightly improved the fuel consumption per kWh sent out, the saving was not enough to balance the increase of 4s. 4d. per ton last year, so that the average fuel cost per kWh rose to 125 per cent above the 1938 level.



Generating cost at steam stations operating under control of Board, excluding certain minor wartime arrangements

On the day of the maximum demand (January 25th, 1945) 16 per cent of station output capacity was out of service, chiefly because labour for maintenance was below 35 per cent of requirements. A cold snap in April increased the demand by 1,330,000 kW after the overhaul season had started, resulting in the shedding of load, in addition to the three occasions in January of which particulars are given. Though plant breakdowns were fewer than in the previous year, there was no corresponding increase in output capacity because labour shortage at the manufacturers' works lengthened the periods taken over repairs. The maximum simultaneous demand of 8,653,000 kW in January 25th compared with 8,351,000 kW in 1944, and the load factor fell to 45 per cent from 47·6 per cent.



Grid protective gear performance

With the return to Greenwich mean time, in spite of the prohibition of display lighting, the winter demand at 5 p.m. sometimes

exceeded the 8 to 9 a.m. peak, which had through the war been some 10 per cent higher. Consumption in war-industry areas declined appreciably but showed a substantial increase in S.E. England.

Among technical developments mentioned is the decision (following the good service already given by oil-filled and nitrogen-pressure cables) to install 132-kV oil-filled cables in the bed of the River Orwell for connecting Cliff Quay power station. Tests on 132-kV large-oil-volume circuit-breakers indicated that they could be modified economically to raise their rating from 1,500 to 2,500 MVA. Two air-blast 1,500-MVA breakers were put into service at Barrow-in-Furness and seven of similar rating for Andover substation were completed at the makers' works, while another is being erected at Northfleet. Protective gear on the grid operated for 682 incidents with 93 per cent of correct clearances. A new form of combined earth-wire and protective-gear pilot cable was installed on the 132-kV line between Bedford and Austin Canons substations; if successful this development should materially reduce the cost of protective gear for overhead lines up to ten miles.

Busbar protection relying upon disturbance of the phase relationship on the two sides of a fault has been put into commission at 132-kV Brighton substation and has proved to be stable in operation; tripping is initiated within half a cycle of the fault occurring.

Experiences with Insulators

Defects in insulators with caps and pins, both cemented solidly to the porcelain, after seventeen years service, amounted to 0·02 to 0·7 per cent of the various makes tested. Insulators installed in the early days of the grid with pins secured in the porcelain by a spring ring and lead filling are being replaced. Glass insulators on a 132-kV line show no deterioriation after five years. Long-term tests are being made on porcelain insulators coated with high-resistance conducting glazes, which ensure uniform distribution of voltage over units of long chains.

In normal atmospheres the natural protection afforded to conductors by aluminium oxide ensures an average life of at least 25 years. Near the sea, however, salt penetrating the strands, corrodes the steel core through electrolytic action, reducing the average life to ten years. Near chemical works the figure may be less. Mid-space core joints have failed on heavy loading owing to gradual deterioration of contact between the components causing the diversion of current to the steel strand and are now used only for temporary repairs. Compression joints with steel and aluminium sleeves hydraulically pressed on the conductors are to be employed for more permanent joints.

For ten years instruments installed at different places have given reasonably accurate information regarding the position and directions of travel of lightning storms, thus enabling control engineers to take steps to avoid interruptions of supply. Faults due to lightning on the Board's overhead lines in 1945 were 0·96 per 100 miles for 132 kV and 2·77 for 33 kV, both rather higher than the previous ten years' average. Successful reclosures after tripping amounted to 95 per cent at 132 kV and 88 per cent at 33 kV. On the lower-voltage sections of the grid, arc-suppression-coil earthing has been efficacious in clearing flash-overs.

New National Tariff

The new national grid tariff (*Electrical Review*, November 16th) which came into force on January 1st, except in North East England is dealt with comprehensively in the body of the Report and in an appendix. To undertakings purchasing their supplies at the grid tariff, the overall cost is expected to be lower by about 2½ per cent.

The large programme of generating plant expansion contemplated during the next five years at prices greatly in excess of the pre-war level will have the effect of reversing the downward trend of production cost. The Board's present budget is, therefore, based upon the expectation of using surplus revenue earned during the early years of the tariff period to off-set losses in the later years.

Gross receipts from the sale of energy amounted to over £85,000,000 and the credit balance of the general purposes revenue account increased by £935,947 to £6,945,883. A further sum of £1,000,000, making a total of £2,000,000, has been set aside as a reserve for the Board's prospective liability for income tax. After meeting all outgoings, including interest and amortization, the credit balance of the net revenue and appropriation account is raised by £2,503,826 to £8,841,731.

The Report contains a good deal of information that could not be divulged during the war, some in the form of diagrams, and an up-to-date map of the grid system. It is published by Whitehead Morris, Ltd., 72-78, Fleet Street, E.C.4, at 1s. net.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Postmaster General has appointed **Sir Drummond Shiels** to be public relations officer to the Post Office in succession to **Brigadier G. C. Wickins,** who is retiring.

Last week we reported the retirement of **Mr. A. D. Markland** from the B.T.H. Company. Mr. Markland received his technical training in mechanical and electrical engineering at the Manchester Technical College, where he obtained an honours certificate in electrical technology. He then held various appointments with the Corporations of Bolton, Ashton-under-Lyne and Glasgow. In 1902 he joined the staff of the B.T.H. Co., in what was then the Power and Lighting Department—the forerunner of the present Turbine Sales Department, of which he was assistant manager for over twenty years. During his service of nearly fourty-four years with the company Mr. Markland has been associated with contracts for the installation of many of the large turbo-alternators supplied to municipalities and power companies, and, especially during the earlier years, assisted considerably in developing the applications of turbo-generators for power supply to industry, including collieries and steel works.

Mr. A. D. Markland

Mr. A. J. Offord, of Kendal, has been appointed deputy electrical engineer and manager to the Winchester Corporation.

Mr. C. S. Cloughton, A.M.I.E.E., has been appointed mains superintendent to the Beckenham Electricity Department. Mr. Cloughton, who is at present senior mains engineer in the Hampstead Electricity Department, received his technical training at Faraday House and subsequently held positions with Johnson & Phillips, Ltd., the Northmet Power Company and the Ealing Electricity Department.

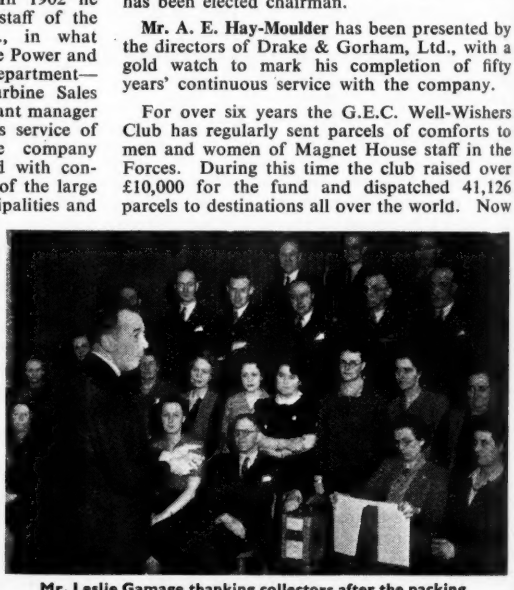
At a recent meeting of the Birmingham Centre of the Illuminating Engineering Society, Dr. S. English presented an inscribed morning tea-set to **Mr. C. J. Allderidge,** the retiring hon. secretary, as a mark of appreciation of his work during the past seven years. **Mr. R. Mackenzie** has been elected chairman of the Centre for 1946-47 and Mr. Allderidge, vice-chairman.

Mr. A. T. Starr, M.A., Ph.D., has taken up an important appointment with Standard Telecommunication Laboratories, Ltd., the recently-formed subsidiary of Standard Telephones & Cables, Ltd. For the greater part of the war Dr. Starr was with the Telecommunications Research Establishment (M.A.P.), and has done notable work in the development of micro-wave radar devices, centimetre-wave pulse telephony and "miniaturisation" technique. Although a specialist in telecommunications, on which he has written a number of books and papers, Dr. Starr is also the author of a book on "The Generation, Transmission and Utilisation of Electrical Power."

Mr. H. Kahn has resigned from the board of Aron Electricity Meter, Ltd. **Mr. E. D. A. Herbert** has been appointed in his place and has been elected chairman.

Mr. A. E. Hay-Moulder has been presented by the directors of Drake & Gorham, Ltd., with a gold watch to mark his completion of fifty years' continuous service with the company.

For over six years the G.E.C. Well-Wishers Club has regularly sent parcels of comforts to men and women of Magnet House staff in the Forces. During this time the club raised over £10,000 for the fund and dispatched 41,126 parcels to destinations all over the world. Now the activities of the club have ceased with the posting of the last parcel—a "bumper" one packed by the president of the club, Mr. Leslie Gamage (vice-chairman of the G.E.C.). Lots were drawn for the parcel, the winner being Sgt. T. Buttle of the W.A.A.F., Middle East Forces. Mr. Gamage thanked the committee and collectors for the club funds, praising their unselfishness and spirit of comradeship.



Mr. Leslie Gamage thanking collectors after the packing of the last parcel

Mr. C. Bradley, A.M.I.E.E., deputy general manager and engineer to the Finchley Corporation Electricity Department, has been appointed acting general manager and engineer in the temporary absence of Lt. Col. C. R. Westlake, M.I.E.E., on a Government mission to East Africa.

Mr. N. Ashton, A.M.I.E.E., electrical engineer and manager to Brierfield Urban District Council, has been appointed to a similar post with Spenborough (Yorkshire) U.D.C.

Highfield & Roger Smith, consulting engineers of 36, Victoria Street, London, S.W.1, have taken **Mr. A. R. Baker** into partnership as from April 1st. Mr. Baker is the son-in-law of the late Mr. J. S. Highfield and has been a member of the staff for some years.

Mr. B. H. Holt, chief assistant engineer, has been promoted to the position of deputy engineer and manager of the Walsall Corporation Electricity Department.

Mr. S. W. Hutton has rejoined Progress Cables & Accessories Co., Ltd., on being released from the Forces, and has been appointed general sales manager.

On April 4th at the Woolwich Works of W. T. Henley's Telegraph Works Co., Ltd., **Sir Montague Hughman,** the chairman, made presentations to four employees of the company with many years of service. They were Messrs. H. F. Groves (49 years), A. S. Rawlings (47 years), S. F. Foote (47 years) and D. L. Janzen (45 years).

Among a number of appointments by the London & Home Counties J.E.A. reported in the *Electrical Review* of April 5th, was that of **Mr. W. H. A. Bellis** as district officer at Twickenham. As Mr. Bellis has since been appointed chief engineer of the Brighouse (Yorks) undertaking the Twickenham post has been given to **Mr. S. F. Osborne,** A.M.I.E.E., of the B.S.I.

Mr. J. L. Loasby, formerly chief technical assistant, has been appointed deputy electrical engineer at Hampstead.

Mr. T. H. Dryden, governing director of L. Weekes (Luton), Ltd., recently presented to seventeen long-service employees of the company a savings certificate for each year of their service, a total of 509.

Mr. Alexander Milne was elected president of the Electrical Society of Glasgow at the annual meeting on April 2nd; the vice-president is **Mr. John Laurie.** It was reported that 61 new members had been elected during the past year, raising the total to 180.

Mr. A. N. Bott, who as already reported has been confirmed in the appointment of county electrical engineer of Kirkcudbright, was born in 1907 at Nottingham, where he received his education at Mundella Grammar School and University College. After a period of training in the Post Office Engineering Department and the Nottingham Corporation Electricity Department he was appointed assistant engineer and surveyor in the Contracts Department of W. T. Henley's Telegraph Works Co., Ltd., in 1930. Later he held appointments with the J. L. Eve Construction Co., Ltd. (resident engineer, Rotherham, Sheffield and Doncaster area), Johnson & Phillips, Ltd. (chief assistant to resident engineer, S.W. England area) and the Westmorland Electricity Supply Co., Ltd. (assistant engineer) before joining the Kirkcudbright County Council in 1935 as mains engineer. In 1936 he became consumers' engineer and in the same year deputy county electrical engineer.

Mr. J. F. Young has been appointed general sales manager in the Lighting Division of E. K. Cole, Ltd. From 1931 until the outbreak of war, Mr. Young was London Area manager of Ensign Lamps, Ltd., whose products are now distributed by E. K. Cole, Ltd. Mr. Young has just returned from active service. He was promoted lieutenant colonel in 1942 and commanded a regiment in the 15th Scottish Division, which saw service in Normandy, and took part in the assault crossings of the Seine, Rhine and the Elbe. He was awarded the D.S.O. for services in North-West Europe, and has recently been appointed Chevalier of the Order of Leopold of Belgium; he also has the Croix de Guerre.

Mr. J. F. Young

Mr. S. F. Steward, director of E. R. & F. Turner, Ltd., and formerly Director-General of Machine Tools, has been elected to the Council of the British Engineers' Association in the place of Mr. F. Ayton, who has retired.

Obituary

Professor E. G. Coker.—We regret to report the death, on April 9th, at Chingford, Essex, of Dr. E. G. Coker, F.R.S., M.Inst.C.E., Emeritus Professor of Engineering, University College, London.

Mr. H. Senior, who was with the Huddersfield Electricity Department for thirty-seven years and recently retired from the position of mains assistant due to indisposition, died on April 4th.

Mr. M. Short.—The death has occurred at Hexham of Mr. Mathew Short, at the age of seventy-nine. Until his retirement in 1932, he was secretary of the former Newcastle-on-Tyne Electric Supply Co. (now the North-Eastern Electric Supply Co., Ltd.). He joined the company in 1890, and was appointed secretary in 1892. Mr. Short was a member of the Council of the Incorporated Association of Electric Power Companies, being chairman of the Secretaries' Committee of that Association.

Electrical Manufacturing in 1945

Report of B.E.A.M.A. Council

THE electrical manufacturing industry has emerged from the war to face greatly increased demands but with its power to meet them impaired, says the Council of the British Electrical and Allied Manufacturers' Association in its report for 1945. There has been improvement in the raw material position but although the labour force has risen by 17 per cent since mid-1939 there is still a great shortage in this respect.

Plant is badly needed by the electricity supply industry, the housing programme presents problems for the lighter side of the industry and the electrical industry is expected to take an important part in the export trade. As regards the last, it is estimated that to reach the "target," exports should be in the region of £65 million annually for the next few years; such a result can only be achieved by carefully-planned and sustained effort.

The Council has had interviews with the Ministries concerned regarding the labour shortage and assurances have been obtained. An arrangement has been made with the Ministry of Supply which should lead to considerable improvement in the labour available for the production of heavy plant, but there is still a serious shortage of skilled draughtsmen and of foundry workers. The last shortage has caused difficulties in the supply of light castings. A scarcity of ceramics is expected to be relieved shortly.

Cost Investigation

It is clear from discussions with the Ministry of Supply that the Government intends to retain some form of cost investigation or price control in its contracts. The Association has stated that while it has no objection to discussing and agreeing prices for any products, agreement should be reached before the orders are placed and the price agreed should be fixed. Members have been advised to adopt this principle.

A modified scheme for the disposal of surplus Government industrial electrical equipment has been adopted with an advisory panel representative of several branches of the electrical industry. Early this year a similar panel for accessories and domestic equipment was established but it has not yet actively functioned.

Proposals for modifying the constitution of the Association are being discussed with the Board of Trade and will be placed before a general meeting before action is taken.

The Association has been assured that no alterations will be made in the existing price-control arrangements without previous consultation. A scheme of supplementary pensions for those who were members of the staff before 1935 is under consideration. It was considered inappropriate to hold an annual dinner this year and, for other reasons, that the British Industries Fair should take place this year; the next Fair is to be held in 1947.

An Export Section is being set up to co-ordinate the work of the two Export Groups. Discussions are continuing on the subject of the disposal or use of Government-owned patents.

Reference is made to the visit of investigation teams to Germany to inspect factories and ascertain what technical advances, if any, were made during the war. Teams covering about a dozen branches of the industry have paid visits and others are being arranged.

Contract Conditions

The Contract Conditions Committee has placed four amendments to Government contract conditions, on points of major principle, before the Federation of British Industries and these are being strongly urged on the Government. A joint committee on contract conditions has been set up by the B.E.A.M.A., the C.M.A., the B.E.A. and the Water-tube Boilermakers' Association. During the year the standard patents clause and the war clauses were redrafted. The Publicity Committee has been reconstituted and the Traffic Committee's activities have included the issue of a memorandum on the transport of heavy indivisible loads. The Standardization and Technical Committees are resuming consideration of problems suspended during the war as well as new ones and a number of subjects which are being dealt with are mentioned in the report.

Arrangements have been made through the Association for the bulk supply of cookers and other appliances for the Government's housing scheme. The Electrical Appliances Development Committee has been active during the year; it has assisted E.D.A. and other organizations in arranging exhibitions and a number of leaflets on various appliances are being prepared.

The report includes references to the I.M.E.A.-B.E.A.M.A. Joint Committee; the Welding Sections; the Economical and Statistical Department; the British Engineers' Association and other bodies with which B.E.A.M.A. co-operates.

Although they have reached the retiring age, the director (Mr. V. Watlington) and the deputy director (Mr. C. Rodgers) are continuing in office until suitable successors are appointed. Sir George Bailey and the Rt. Hon. Oliver Lyttelton have been elected vice-presidents.

Sixteen new members joined the Association during 1945 and two new sections, Industrial Capacitor and Water Turbine, were formed.

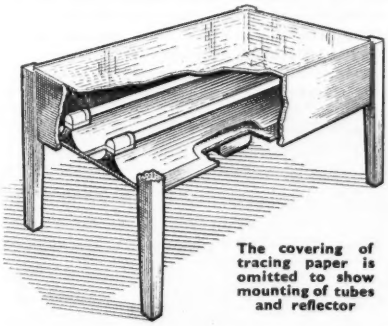
The report concludes with an obituary section, which includes the names of two vice-presidents, Mr. John Taylor and Mr. Frank Parkinson.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Drawing-Office Lighting

IN conjunction with the chief draughtsman here, Mr. A. M. Pape, I have evolved the scheme shown in the accompanying illustration for illuminating our drawing-office table



The covering of tracing paper is omitted to show mounting of tubes and reflector

with the elimination of shadows, which may interest your readers. The table top consists of ⅜-in. plate glass covered with two thicknesses of tracing paper. This gives a diffused even light over the whole of the table top. Best results are achieved by the use of transparent rules, curves and squares. The light source is two 80-W fluorescent tubes with suitable reflectors running from end to end and supplied from two 5-A socket outlets in the floor. The auxiliary apparatus for the tubes can be seen in the cut-away part underneath the table.

West Looe, Cornwall. E. WILLIAMS.

Boiler Control

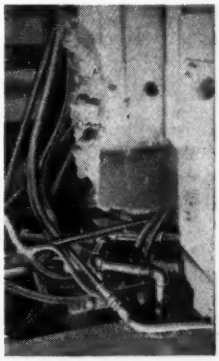
IF Mr. Szwander had seen the simple a.c. commutator motor installations in this country either with automatic pneumatic control of British make or automatic electrical control of Continental make I am sure he would not reply to my comments as he does in your issue of March 29th. The fact that large d.c. installations are in operation and on order is no proof; if such arguments were to hold good there would be little progress in engineering.

Mr. Szwander admits in his original article that the speed characteristics are different, which means that the variable d.c. voltage system does not incorporate inherently the co-ordination of speed but requires additional field regulation. In the a.c. system this correction requires no extras but simply means that the impulse from the main boiler control is corrected by another impulse, e.g., from the CO_2 apparatus, both impulses working on the same servo-motor, shifting the brushgear. Changing over from automatic to non-automatic service has nothing to do with D.C. or A.C.; it is a matter of control only.

Druten, Holland. H. GIEBERS.

Plumbing Feats

THE importance of correct plumbing having been mentioned in the recent I.E.E. paper by Messrs. Grierson and Jackson, I think that the enclosed photograph may be of interest to your readers. It shows



A complicated piece of plumbing

what a succession of plumbers can do in fifty years if left to their own devices.

The pipe seen in the foreground of the photograph ran through several rooms and then into a wall where it had been sealed off. In its course it passed under some stairs and in this most inaccessible position there was a branch pipe with a valve. H.C.C.

Automatic Telephony

A MODERN automatic telephone exchange operating on the Strowger step-by-step system is described in a paper by MR. R. C. KYME to the I.E.E. London Students' Section.

The author first explains the principles on which connections between two subscribers are effected by means of multi-contact switches operated electrically under the control of the calling subscriber. Types of switch and relay mechanisms are next dealt with and, finally, a particular exchange is described.

Power Engineers' Salaries

Revision of N.J.B. Schedule

AT a meeting of the National Joint Board of Employers and Members of Staff (Electricity Supply Industry) on April 5th, it was decided that as from April 1st, the basic salaries set out in the Schedule to the N.J.B. Agreement of April 28th, 1923, consolidated on November 26th, 1943, should be revised so as to provide for an increase of 15 per cent in the minimum basic salary, the increase diminishing by 0·0625 per cent for each rise of £5 in salary to nil on a basic salary of £1,400.

It was provided that the increased salaries should not apply to men under 21 years of age unless they were required by the undertaking to carry out the duties and responsibilities of a graded position; that the increases of salary were to cover the normal working conditions of rotating shifts; and that Clause 45 should be deleted from the Agreement as from April 1st, and any increased remuneration granted under that clause before April 1st should merge in the increased salaries now agreed. Clause 45 relates to extra duties performed in connection with a station operating in parallel with the Central Electricity Board's system.

The Schedule is being reprinted showing the increased salaries together with a new schedule showing the current value of the increased salaries adjusted to six points of addition under Clause 33 of the Agreement.

Taxation Relief

How the Budget Proposals Affect the Electrical Industry

LAST week we gave a brief summary of those points in the Budget statement made on April 9th by the Chancellor of the Exchequer. In this it was stated that the excess profits tax would continue at the rate of 60 per cent until the end of this year when it would be repealed. We regret that an error was made in saying that it would be replaced by a "profits tax"; what the Chancellor actually said was that the name of the National Defence Contribution (1s. in the £ on all profits before distribution) would be changed to the Profits Tax. He had carefully considered whether he should increase this tax or introduce some new tax on profits or excess dividends but had not reached a final decision. He would be guided by the general budgetary and financial situation and to some extent by the conduct of private enterprise, i.e., whether profits were distributed in the form of extra dividends or were "ploughed back" into the business.

Following Mr. Dalton's announcement regarding purchase tax, which he regarded as one which would be retained to yield an increasing revenue during the next few years, the Commissioners of Customs and Excise have issued Notice No. 78E, giving details of the changes, which took effect on April 10th. Producers of "unit" kitchens will be interested in the remission of the tax from "Cupboards, dressers, draining boards and similar articles designed for use in kitchens." Electric kettles and other cooking utensils incorporating heating elements are also exempted from the tax, as are hand lamps designed for operation from electric mains, head, side and tail lamps designed for use on railways, and signal gantry lamps. Another class from which the tax is remitted is "Clocks designed for use as public clocks with dials not less than 2 ft. in diameter or with dials having a diagonal measurement of 2 ft. 6 in. or more." It is noted that this relates to turret, tower, church and other public clocks with dials of the specified dimensions. The tax on hair-waving and hair-drying machines, and radio-gramophones is reduced to 33⅓ per cent, putting the last class on the same basis as radio apparatus.

Mr. Dalton said that it had been suggested by the Minister of Education that the existing rate of income tax relief on contributions by employers to current costs of technical colleges should be extended to cover capital contributions also. He had therefore agreed to grant an income tax allowance in respect of capital contributions made by an employer to a technical college attended by his own employees.

Electro-tinning Steel Strip

The "Ferrostan" Process

LAST month's informal meeting of the Institution of Electrical Engineers was a joint one with the Electrodepositors' Technical Society.

MR. C. FRENKEL, in opening the discussion, said that British plant for the electro-tinning of steel strip, known as the "Ferrostan" process, was not yet working because the plant had not arrived from America. This electrolytic method was not a wartime expedient and there were some 40 plants operating the process in the United States.

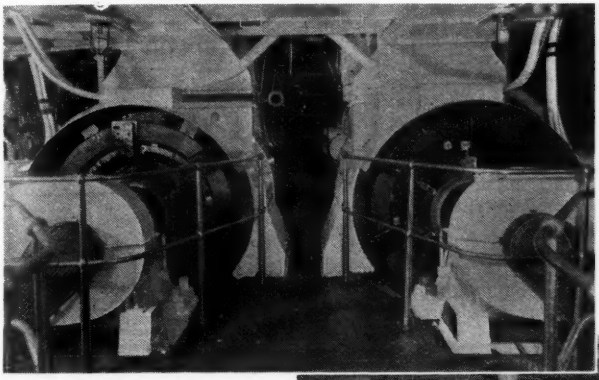
After Mr. Frenkel had outlined procedure and advantages claimed for the method MR. P. F. GROVE dealt with the electrical equipment needed for the process. The main consideration in plating was the most economical and convenient means of furnishing energy at low voltage to the tanks. Rectifiers were replacing motor-generators for this purpose in the United States, the copper-oxide type being mostly employed. The plant for handling the steel strip while it was being plated was controlled on the Ward-Leonard system. The flow-melting operation was effected by heating the strip directly by current passed through it from conductor rails.

The subsequent general discussion was mostly in the form of questions about details of operation, capital and maintenance costs, as well as the relative merits of motor-generators and selenium rectifiers.

Diesel-Electric Ship

Conversion of the "Vecta"

THE motor ship *Vecta* is to be recommissioned by the Southampton, South of England and Isle of Wight Royal Mail Steam Packet Company after conversion to Diesel-electric drive. She was the largest "Red Funnel" passenger vessel on the Southampton–Isle of Wight run and was put into service just before the war. Remarkable manœuvrability was achieved by the use of the largest Voith-Schneider propellers built up to that time, but ultimately certain defects developed and it was decided to adopt a Diesel-electric system with normal screw-type twin propellers, retaining the original engines.



English Electric main generators showing drive to 40-kW auxiliary generators and (on the right) main propulsion motors

To accommodate the new propellers and tail shafts comprehensive modifications to the after end of the hull, together with the installation of the new electric propulsion equipment, were carried out by John I. Thornycroft & Co., Ltd., who built the vessel. The complete twin screw electric propulsion equipment was obtained from the English Electric Co., Ltd., which was responsible for supplying the main propelling engines when the ship was new.

The engine governor gear is now adapted to alternative speeds of 375 or 325 r.p.m., the latter for day cruises with less power than on fast ferry service.

The two engines are six-cylinder, direct injection, four stroke, and develop 750 B.H.P. each. The directly-coupled main propulsion generators are 500-V d.c. machines of the single pedestal bearing type. The magnet frames are split and have a special cradle mounting which allows the bottom half to be rotated for overhaul. The generators and motors are forced ventilated by air trunked in from a fan house on the promenade deck and discharged into the engine room.

The propulsion motors have a maximum rating of 630 S.H.P. each at 425 r.p.m. for ferry service conditions, and a continuous cruising rating of 380 S.H.P. at 350 r.p.m.; thus the propeller speeds are higher than those of the engines—a most unusual feature in the case of Diesel-electric installations and occurs in this case only because of the relatively high speed and restricted draught of the ship.

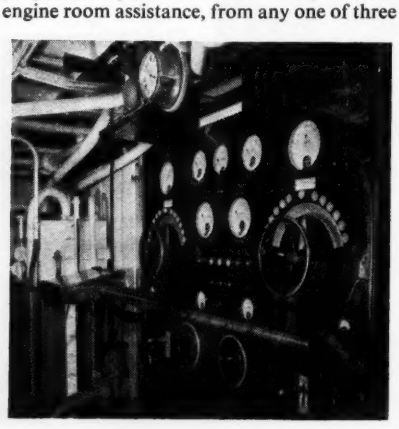
The propulsion motors and generators are

in one series circuit, with "set-up" switches to permit of "shorting" the necessary connections when either one of the generators is out of service. The switches are of the "make-before-break" type and so can be operated without interrupting propulsion. Operation of either also places a "speeding-up" resistance in each of the two motor fields so that, in spite of the loss of circuit voltage, the whole of the power available from the remaining generator is available for propulsion. The general scheme of control is on the Ward-Leonard system.

Control of Propellers

The use of separate exciters for the motors allows the propellers to be controlled independently, while the total propulsion power is shared equally by the two generators at all loads. Full and independent control of the propellers is still maintained even if only one generator is in service. Should one engine lose power the load on its generator is automatically removed (without shutting down the engine) by the opening of a breaker in the field circuit and, furthermore, the effect is reduced power on both propulsion motors and not on either singly.

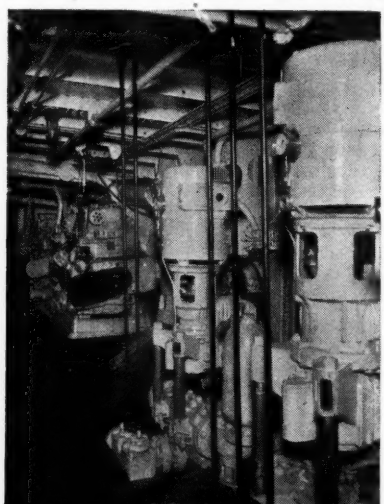
The normal operational control of the propulsion system is carried out, without engine room assistance, from any one of three



Propulsion control board

mechanically coupled twin screw telegraphs, one in the wheelhouse and one in each wing of the bridge, connected electrically to the propulsion controllers in the engine room through a simple pilot motor system, giving six speeds ahead and six astern.

The two existing Ruston & Hornsby auxiliary Diesel engines with 25-kW English Electric generators have been retained for emergency and port use. In addition two English Electric 40-kW generators have been installed,



Auxiliary sets with general service and water pumps in foreground

chain driven from shaft extensions on the main propulsion generators. They are compound wound with a diverting resistance connected across the series field at the higher speed. They are used for excitation and auxiliary load, thus making it unnecessary to run an auxiliary engine at sea.

Dismountable Motors

WITH the object of reducing the time needed to replace a faulty driving motor, in order to minimize the loss of production involved, a Spanish firm of manufacturers (Bomba Prat S.A., Badalona) has designed and patented a dismountable machine which is now being manufactured on a considerable scale in small sizes. Its design departs considerably from normal in that component parts are assembled in distinct groups so that each group can be withdrawn or detached *in situ* for substitution within a few minutes. For example the rotor and bearings can be replaced without interfering with the stator frame, or the latter without dismantling the former. Ball bearings are fitted which enable 10,000 hours' service to be guaranteed without renewing the lubricant. Prices and speeds are stated to be almost the same as those of equivalent normal machines, but the new motor is a trifle longer.

COMMERCE and INDUSTRY

Sign Makers' Activities. Supply Authorities' Training Schemes.

Sign Manufacturers' Association

THE report for 1945 of the chairman of the Electrical Sign Manufacturers' Association, Mr. S. D. Moyse (Claude-General Neon Lights, Ltd.), mentions that the Association was formed in January, 1945, for the purpose of consolidating the interests of, and promoting good understanding between, the manufacturers of electrical signs. There were 14 founder members and membership at the end of 1945 was 28.

Co-operation has been established with all Government Departments concerned (particularly with the Ministries of Labour, Town & Country Planning and Works). The electrical sign industry has been unable to take full advantage of the change-over from war to peace owing to the continuance of the Lighting (Restrictions) Order and Control of Buildings Operations Order. Members have been able to devote attention, however, to the renovation of existing signs, the supply of replacement parts and export business.

The Association has obtained a clear interpretation of the Control of Buildings Operations Order in relation to electrical signs: it is now clear that all glass and h.v. equipment is outside the scope of the Order and all detachable fittings, e.g., background letters, box signs, lighting fittings, are also uncontrolled as none of these form part of an actual building structure. All decorative outlining of buildings is also outside the scope of the Order except so far as the actual plugging or fixing to the building structure is concerned. Liaison has been established between the Association and the Royal Institute of British Architects.

Leixlip Power Plant

A contract has been placed by the Electricity Supply Board of Eire with Hussey, Egan & Pickmere, Ltd., of Birmingham, for a dam and power station on the River Liffey at Leixlip, near Dublin. It will be the third hydro-electric station on the Liffey. Work is already in progress on the River Erne hydro-electric scheme at Ballyshannon, Co. Donegal, and on the peat-burning steam station at Portarlington.

St. Helens Training Scheme

Mr. P. Bregazzi, the borough electrical engineer and manager at St. Helens, has sent us particulars of an apprenticeship scheme recently approved by the Electricity Committee designed to provide high-grade tradesmen and engineers for the Department's staff and for the electricity supply industry generally. Boys of school-leaving age are selected on a basis of educational progress, aptitude for engineering and personality, and apprenticed until the age of twenty-one when their apprenticeship deeds are endorsed to indicate satisfactory fulfilment.

Technical education is provided for on at least one day a week in the Department's time and fees are refunded to successful students at the engineer's discretion. Quarterly progress reports are made by the heads of departments and once a year a representative of the management interviews apprentices to give advice and guidance. At an advanced stage apprentices training for the higher technical and administrative posts can obtain experience with a manufacturing concern for a period of from six to twelve months, the Department paying a lodging or travelling allowance.

Mr. Bregazzi says that the scheme has been organized without interfering in any way with the Department's business or any increase in staff.

Jointing School at Bedford

With only half of its pre-war skilled jointers the Bedford Corporation Electricity Department finds that it has to cope with an increasing demand for new connections involving reinforcement of its mains. In consequence arrears of work are accumulating and as the Department found it impossible to get jointers from outside the undertaking, it established a school last year for the training of young men returning from the Forces in the art and mystery of cable jointing. Great success is reported. The school is in charge of a skilled plumber-jointer who trains six pupils at a time, these attending for two and a half hours on two evenings a week. The training begins with the elementary work of taping cores and fixing cut-outs and progresses by easy stages to the most advanced work of plumbing joints and working on live cables. To back up this tuition the men are employed as far as possible as jointers' mates during the day.

Domestic Appliances in New Zealand

A correspondent states that a scheme for the mass production of electrical refrigerators and washing machines is now well advanced in New Zealand. The new equipment is a double unit fitting into existing sink and cupboard recesses in State-controlled properties and does away with cumbersome wash houses, which may if desired be converted into additional rooms for the tenants. Apart from being installed in State houses, these appliances will be on sale to the public generally.

At present there are several manufacturers producing a limited number of washing machines and refrigerators. Raw materials, and one or two components which had to be imported, such as motors and certain switchgear, are still in short supply. The output of other electrical appliances, including toasters, irons, kettles and heaters, is progressing well, and is on a scale to meet minimum needs.

Diesel Engines

Diesel engines designed and made by F. Perkins, Ltd., 73, Lincoln Road, Peterborough, originally for fast Admiralty vessels may now be adapted to drive generating sets and for other industrial purposes. Type T.12 is of light-weight and small bulk relative to its maximum rating of 850 B.H.P. at 2,300 r.p.m. with a fuel consumption of 0·4 lb B.H.P.-L. The twelve cylinders are arranged in two banks of six each forming a V-angle. A flywheel vibration damper

is provided and a supercharger of the centrifugal type; also C.A.V. fuel pumps and two C.A.V. 24-V starting motors operating in parallel. Apart from normal compression ignition, to assist starting when extremely cold two ignition plugs are fitted in each induction manifold and connected in series-parallel. They are of the hot-wire type, needing 30 A at 12 V and becoming incandescent in 15 seconds. A hand-operated " Ki-gass " primary pump delivers fuel through two injector nipples in each induction manifold slightly forward of, and adjacent to, the ignition plugs, so that the fringes of the sprays impinge on the hot-wire elements. The resulting combustion raises the temperature of the compressed cylinder charge sufficiently to cause spontaneous firing when the main fuel is injected.

Henley's New Canteen

In July, 1944, the canteen at the Woolwich Works of W. T. Henley's Telegraph Works Co., Ltd., was wrecked by a flying bomb and temporary arrangements were in use until April 4th when a new canteen was opened by Sir Montague Hughman, the company's chairman. This is a single-storey building with accommodation for about 350, comprising a main hall, kitchens, stores and two dining rooms. Up-to-date cooking, heating and lighting equipment has been installed. At the opening ceremony Mr. A. W. McArthur, works manager, said that many difficulties had delayed the completion of the new canteen but these had now been overcome. Others present at the opening were Messrs. A. T. Winder, assistant works manager, H. A. Hughes, personnel officer, C. A. Walker, chief of the warehousing and dispatching department, and S. E. S. Sellers, principal foreman.

New canteen at Henley's Woolwich Works

In an adjoining building employees were able to see an exhibition demonstrating the company's wartime achievements, including its part in " Pluto " and the defeat of the magnetic mine.

More Motor-Driven Appliances Needed

Mr. E. E. Hoadley, M.I.E.E., spoke on " Our Hopes for the Electrical Future " at a meeting of the London Branch of the Electrical Association for Women on April 9th. He outlined the electrical apparatus most in demand before the war and suggested that the Industry should in future devote more thought to the supply of motor-driven appliances, such as mixabeaters at a moderate price. Dishwashers must also be obtainable at a price to suit the pocket of the average consumer, as these appliances were the greatest labour savers to the housewife.

American G.E. Orders Cut

The president of the General Electric Co. of America stated last week that new orders received for the first quarter of 1946 totalled $11,775,000 compared with $395,446,000 in the same period of last year. The reduction, he said, was due to the nine-week strike which closed the plants.—*Reuter.*

Non-Ferrous Scrap Metal Prices

The Minister of Supply has issued a new list of prices of non-ferrous scrap metals. These are prices at the Ministry's depots at which the Minister is prepared to effect a sale to a buyer, subject to having sufficient material of that particular quality available at a convenient depot at any particular time. The list relates to delivery within the current and three following calendar months. The schedule may be amended without notice in the light of changing circumstances and prices may be altered in accordance with market conditions, production costs and other factors. Any inquiries regarding this list should be addressed in the first instance to the Directorate of N.F. Metals (Scrap Disposals Dept.), Berkeley Court, S.E. Wing, Glentworth Street, London, N.W.1 (telephone: Welbeck 6677).

Eastbourne and Chiefs' Salaries

At its recent meeting the Eastbourne Town Council was recommended by the Electricity Committee to become members of the District Joint Committee of Local Authorities and Chief Electrical Engineers, No. 11 Area. Councillor Morgan Jones, moving an amendment that the Council should not join, contended that they should maintain control over the salaries of their chief officials as a vital matter of principle. The amendment was carried by 16 votes to 14.

Trade Announcements

The International Delicolor Corporation, Ltd., has been formed to supply the " Delicolor " system of theatre lighting, invented by Mr. R. Gillespie Williams and patented by W. J. Furse & Co., Ltd., overseas, with the exception of the United States and Eire.

Associated Electrical Industries, Ltd., has purchased the business of the International Refrigerator Co., Ltd., and the latter company

will, in future, operate as a subsidiary of A.E.I. Mr. J. F. Stewart has resigned the position of chairman and Mr. E. P. Grimsdick has been appointed in his place. Mr. R. J. Simpson continues as managing director and the company's business will be carried on generally as at present.

Thorogood Radio, Ltd., 44/45, Tamworth Road, West Croydon (telephone: Croydon 7417/8) has re-opened its retail business under the control of Mr. S. Green who has resigned his directorships of Green Electrical Industries, Ltd., Metro Gauge, Ltd., and G. H. Laboratories, Ltd.

Appleby & Co. have moved their headquarters to 6-10, Chandos House, Buckingham Gate, S.W.1. (Telephone: Abbey 5011) from which they control a large sales organization covering England and Northern Ireland. The firm has been re-organized and has extended its activities to become manufacturers' agents and distributors for domestic electrical appliances, etc.

Cheaper Aluminium

The Minister of Supply has announced a reduction in the price of virgin aluminium in ingot or notch bar form from £85 to £67 a long ton delivered into consumers' works. The new price applies to metal of a purity of 99 per cent to 99.5 per cent inclusive, with premiums for higher purities. This reduction in price is made possible by reason of a contract which has just been made by the Ministry for the purchase of 215,000 metric tons from Canada during the years 1946 and 1947.

Machine Tool Advisory Council

The Minister of Supply has set up a Machine Tool Advisory Council to act as a liaison body between the Government and machine tool producers in an endeavour to maintain an adequate and efficient industry. The chairman is Mr. S. F. Steward who was, until recently, Director-General of Machine Tools, and among the members is Mr. W. G. Bass (Ferranti, Ltd.). A similar body is to be established for the gauge and tool industries to work in co-operation with the Council.

Aswan Dam Tenders

The Hydro-Electric Power Commission of the Egyptian Ministry of Public Works announces that in view of the present currency difficulties the letter of guarantee for £E5,000 demanded for the purchase of the specifications and conditions of tender for the Aswan Dam hydro-electric scheme has been waived.

Report on Patents

The Board of Trade Committee on the Patents and Design Acts has produced a second interim report (Cmd. 6789, Stationery Office, 9d.) This deals with the question of patent litigation; the Committee recommends that two judges with the necessary technical or scientific qualifications should be appointed specially to conduct the trial of patent actions. If necessary a scientific assistant should sit with them, or assist them in a preliminary study of the points at issue.

Another matter with which the report deals is the discouragement of the operation of British patents in this country by foreign suppliers of similar goods to the British market. While the subject of cartels was not within its terms of reference, the Committee considers that the patent law should be in consonance with any measures which might be taken to limit or control monopoly in the public interest.

Teachers and Research

In a circular to education authorities the Ministry of Education suggests that teachers in technical colleges who show the necessary aptitude should be given facilities to undertake research work and be allowed to devote a substantial amount of time to such work. It is also considered desirable that teachers who are competent to act as advisers to industry should be allowed to do so. Applied research on behalf of particular industries should be encouraged and those firms financing it should be allowed the first use of results.

Railway Signalling

A public demonstration of modern railway signalling devices, selectors, relays, indicators, lamps and primary cells, as well as communication equipment, as used on the L.M.S. system, was staged at Euston Station, London, last week. The display included a short length of full-size rail track with points and signals which visitors were able to operate from a 20 ft high replica of a main line signals box. The Minister of Transport performed the opening ceremony.

Price Decontrol in America

In the most extensive decontrol action ever taken, the Office of Price Administration last week announced the suspension of price control on a number of heavy machinery and equipment products,including electrical equipment, machine tools, process, construction, transportation and miscellaneous machinery and equipment. This decontrol is of an experimental nature, the O.P.A. points out, and presents the first broad step in suspending industrial capital goods from price control in accordance with the agency's policy of removing such controls as soon as they are no longer needed to safeguard against inflation.—*Reuter* (Washington).

Philips Lamp Exports

Philips Lamps (Holland) expect exports for 1946 to reach a total value of 100 million guilders.—*Reuter.*

TRADE MARKS

APPLICATION has been made for the registration of the following trade marks. Objections may be made within one month from April 10th :—

LOKTOR and LOKSYN. Class 9. Nos. 638765/6. Electrical measuring instruments: and electrical control, indicating and transmission apparatus included in Class 9.—Pilot Engineers, Ltd., Ford Street, Chestergate, Stockport.

METRARC. Class 17. No. 635317. Electric arc shields, electric arc resistors, electrical insulators and electric arc resisting and heat insulating materials ; all made wholly or principally of asbestos.—Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, W.C.2.

PARLIAMENTARY NEWS

By Our Special Reporter

Electricity on Farms

LAST week in the House of Commons Mr. E. Roberts asked the Minister of Agriculture how many farms had electricity supplied to them in Wales and England, respectively, and what proportion of the total number of farms in each country those figures represented.

Mr. Tom Williams said that the national farm survey undertaken between 1941 and 1943 showed that there were then approximately 65,000 agricultural holdings in England and 4,000 in Wales supplied with electricity from public mains, or 27 and 9 per cent respectively of all farms. Holdings with private supplies numbered some 8,000 in England and 1,000 in Wales or 3 and 9 per cent. of all farms. The figures to-day would be rather higher.

Electric Motors

Mr. Erroll asked the Minister of Supply what steps he was taking to increase the supply of electric motors of all sizes.

Mr. Wilmot said that the principal difficulty was the shortage of labour for a greatly increased demand. They were in consultation with the industry as to how best to improve the supply.

Relaxation of Import Control

Replying to a question by Mr. Rhodes on April 8th, Mr. Marquand, Secretary for Overseas Trade said that the Government had had under consideration the operation of the import licensing system with a view to seeing what steps could be taken, within the limits dictated by the United Kingdom's balance of payments position, to facilitate the re-opening of established trade connections which were at present interrupted in certain categories of manufactured goods for which no import licences were being granted. The Government had decided that it was desirable to admit within these limitations small amounts of manufactured goods at present completely excluded. This relaxation would apply to imports of specified goods from countries which were willing to operate the necessary administrative arrangements, and whose underlying financial arrangements with the United Kingdom made such relaxations possible.

Accordingly, where it could be shown that an overseas manufacturer of a particular class of goods had an established market for those goods in the United Kingdom before the war, applications for import licences on the basis of approximately 20 per cent of the value of his pre-war trade would be favourably considered. The necessary arrangements had already been worked out in the case of Canada and the list would include carbon electrodes, industrial porcelain insulators, cooking and heating appliances, vacuum cleaners and parts, dry batteries (torch and high tension), and sparking plugs.

Railway Electrification

On April 9th Mr. Edward Davies asked the Minister of Transport what progress had been made in the electrification of suburban railway services as recommended in the Final Report of the Royal Commission on Transport, 1930.

Mr. Barnes said that since the date of the Report the mileage of lines electrified has been as follows:—Main-line railways 480¼ route miles; London Passenger Transport Board 24 miles. In addition, electrification of the following route mileages was in hand, but was interrupted by the outbreak of war:—Main-line railways 125¼ route miles; London Passenger Transport Board 62¾ route miles.

District Heating

On April 12th Mr. Bossom asked the Minister of Fuel and Power how many local authorities in the country had made, or were making, arrangements to set up district heating; and what steps he was taking to encourage more local authorities to adopt district heating at the earliest possible opportunity in order to save fuel.

Mr. Shinwell said he had set up, in conjunction with the Ministers of Health and Works, a Committee on Domestic Heating Problems, with a sub-committee of technical representatives of the interested Ministries, to consider district heating generally and, in particular, specific schemes proposed by local authorities. One local authority scheme had been submitted so far, and had been given provisional approval. A number of other local authorities were known to be considering the matter. He would be glad to know of any other schemes, and to arrange for his technical officers to advise on them.

Telephone Expansion

Moving the second reading of the Post Office and Telegraphs Bill on April 12th, Mr. Burke, Assistant Postmaster-General, said that the Bill enabled the Post Office to borrow £50 million of which £46 million was for the telephone system. There was a list of 300,000 applicants for telephone service and connections were being made at the rate of over 50,000 a month; the pre-war rate was 36,000. It was hoped to raise the rate of connection to 700,000 a year in the future. During the next few weeks the four millionth telephone would be installed. Already £3,000,000 worth of new plant for exchanges had been ordered representing about 300,000 lines at 360 exchanges.

Inland telegraph traffic during 1945-46 was 29 per cent higher than in 1938-39.

Air-Blast Breakers at Barrow

First 132-kV Installation in Great Britain

By M. A. Garrett, A.M.I.E.E.

FOLLOWING the "selection" of the generating station of Barrow Corporation, a 132-kV double-circuit overhead line was installed by the Central Electricity Board between a new substation on the outskirts of Barrow and a new grid substation at Natland, South of Kendal. Messrs. Kennedy & Donkin were the consulting engineers for the complete scheme. At Barrow the two incoming lines and outgoing cable connections to the town substation are controlled by 132-kV air-blast circuit breakers—the first to be installed and commissioned in this country.

The whole installation is the result of many years of research and design work appertaining to the use of compressed air for circuit interruption, involving thousands of tests, both in the factory and on the short-circuit test plant and including the development of nozzle contacts and special valves for sequential control. Furthermore the selection of pneumatic ancilliary apparatus involved pioneer investigations of new problems in pneumatic engineering.

The 132-kV station is of the outdoor mesh-connected type, suitable for extension up to six equipments (Fig. 1). The control of the station, including all alarms, is over a supervisory channel from the generating station, local control being also provided for maintenance and emergency conditions. "Duo-Blast" air circuit breakers* and their current transformers are located on concrete rafts at ground level, the complete arrangement being housed in the equivalent space of a bulk oil circuit breaker (Fig. 2). All clearances are in accordance with the relevant British Standards and the self-contained floor-mounting framework obviates the necessity of providing local protective screens.

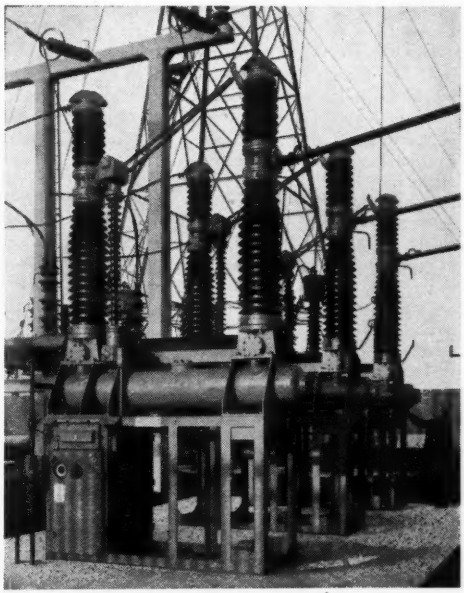


Fig. 2.—General view of "Duo-Blast" 132-kV air-blast breaker at Barrow

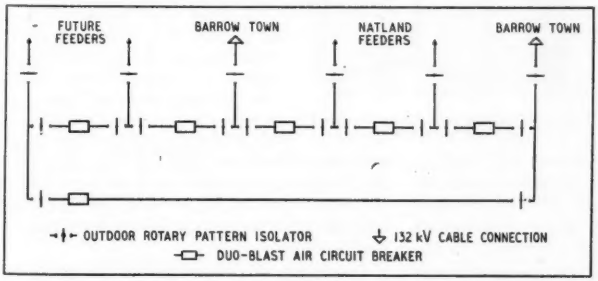


Fig. 1.—Single-line diagram of 132-kV mesh-connected station

This design of circuit breaker comprises

* See High-Voltage Circuit Breaking, by E. M. Dakin and W. A. McNeill, *Electrical Review*, September 15th, 1944.

three single-phase units each with separate air receiver and floor-mounting framework. The three local receivers are interconnected by large diameter copper pipes, the resultant three-phase bank being in turn coupled to the duplicate bus-pipe pneumatic system fed via reducing valves from the main air storage.

Each single-phase unit consists of two main vertical porcelain insulator pillars, each supporting a "Duo-Blast" interruptor and housing the pipe supplying air to the interruptor head. The integral single-blade isolator of each single-phase unit is located between the interruptor heads and moves in a vertical plane. Operation of the isolator is by means of a torsional drive and mechanism; all compressed-air operating valves are at earth potential. Main blast valves controlling the air flow to each interruptor head are also at earth potential and are situated at the base of each vertical pillar. Electrical and pneumatic control equipment is in kiosks in accessible positions in the framework of the breaker.

Each breaker possesses electrical and pneumatic interlocks, among which are:—A pneumatic-electrical interlock to prevent the breaker being opened or closed at too low an air pressure; a pneumatic interlock to prevent the tripping valve operating until the closing operation is completed (as the closing operation always takes precedence over the tripping operation "hunting" is eliminated); an interlock to prevent the breaker "pumping" when closed on to a fault, even though the control circuit is held closed. The design of the valves is such as to guard against creepage action arising from leakage from faulty control valve seating.

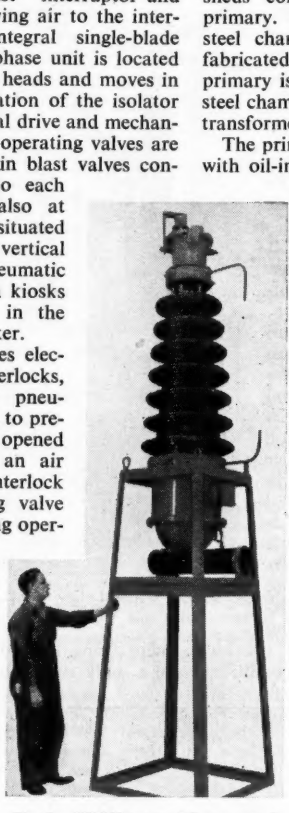


Fig. 3.—132-kV separately mounted current transformer

Simplicity and ease of maintenance is one of the principal features of this breaker. Upper retractable and lower fixed-nozzle main contacts of each interruptor head can be dismantled and removed in less than five minutes. Inspection and adjustment, if necessary, can then be carried out at the bench under favourable working conditions.

Current Transformers

The current transformers (Fig. 3) are separately mounted and connected in the circuit adjacent to each breaker. The whole design is suitable for floor mounting and is of the "beehive" pattern, with a single oil-filled porcelain insulator with weatherproof sheds containing the upper part of the primary. The whole is mounted on a welded steel chamber, located and supported by fabricated steel framework. The base of the primary is contained in the oil-filled welded steel chamber, which also houses the current transformer secondaries.

The primary is a multicore cable insulated with oil-impregnated paper, the quantity of oil per transformer being 14 gallons. The oil filling is maintained by pressure, utilizing a separately mounted oil conservator located in the supporting framework of each current transformer.

The secondary leads are brought out to an accessible terminal box on the side of the welded steel chamber and interconnected to the protective relays by means of multicore weatherproofed lead-covered cable.

Pneumatic Installation

Since the operation of an air-blast breaker is entirely dependent upon its air supplies, the pneumatic installation must be adequate, reliable and efficient. The arrangement provided is dependent largely upon the operating conditions and location of the site. The installation at Barrow (Fig. 4) is designed to meet the present and immediate future requirements, with facilities to augment the main air storage if required. The main air storage comprises four seamless steel cylinders each of approximately 20 cu ft capacity (volume by water) connected to form two duplicate storage receivers and provided with stop valves for isolation and drainage.

Duplicate air compressors charge automatically the main air storage system. The

compressors are of the two-stage air-cooled design, having an output of 21 cu ft per min of free air delivered—maximum pressure 600 lb per sq. in. gauge—each directly coupled to a squirrel-cage motor and the whole mounted on a common bed plate. Each machine is complete with first- and second-stage coolers, pressure gauges, centrifugal unloader and fusible plugs.

The main air storage is at 600 lb per sq. in. gauge, a higher pressure than the normal operating pressure of the breaker to ensure efficient moisture extraction; furthermore, high-pressure main-air storage allows a considerable quantity of air for the operation of the circuit breakers to be stored economically.

The circuit breakers are connected to the main air storage via instrument-operated reducing valves by duplicate copper pipe lines located and supported on the side of a brick and concrete trench, in which are also laid the main control and auxiliary multicore cables. Provision has been made for drainage at several points of the system as the substation is normally unattended.

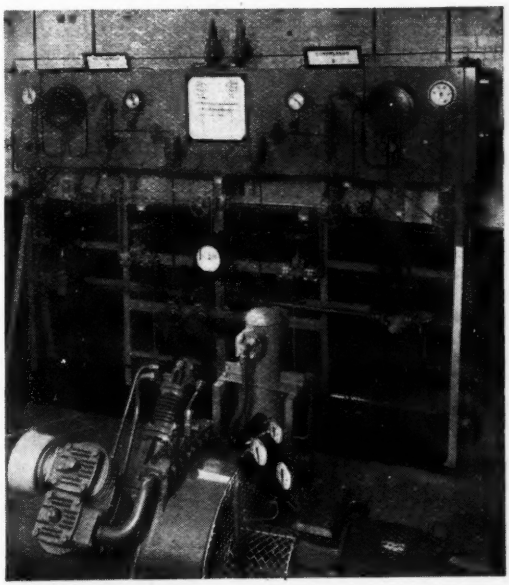


Fig. 4.—Compressor room showing pneumatic control board

All electrical controls are located on a totally enclosed floor-mounting sheet-steel cubicle adjacent to the air compressors in the compressor house. Each of the air-compressor motors and its associated control is fed separately from the main substation medium-voltage switchboard; thus the isolation of one machine for maintenance does not affect the control of the other.

Selector switches cut out the automatic operation and allow each machine to be started by hand for maintenance. With normal automatic control one compressor starts up when the pressure in the main air storage drops to about 550 lb per sq. in. gauge; the second machine does not commence to run until there is a further decrease in pressure down to approximately 500 lb per sq. in.; under this condition both machines continue to recharge the main air storage until the normal pressure of 600 lb per sq. in. is attained, when they are closed down automatically. Pressure step control is effected by pressure switches of the Bourdon-tube type.

Since only one compressor runs under normal conditions, i.e., to replenish the main air storage due to leakage and occasional breaker operation, either compressor can be given preference to cut in at 550 lb per sq. in., locally or at the generating station over the supervisory channel. The latter arrangement allows a frequent change of compressor preference so that one compressor may not be idle for any length of time. For maintenance the correct operation of the selection device can be checked from the local control panel where visual indication of selection is also given.

The main stop valves, instrument-operated reducing valves, safety valves, pressure switches and gauges are located on an open fabricated floor-mounting frame in the compressor house. Mounted on the switchboard is a diagram plate of the complete pneumatic system, all valves being labelled. This arrangement also enables precise instructions for isolation of apparatus to be given and details to be logged.

The author thanks the chief engineer of the Central Electricity Board and the directors of Ferguson, Pailin, Ltd. for permission to publish photographs and details.

Room Circuits

The Bearing of the I.E.E. Regulations

By R. H. Rawll,
M.I.Mech.E., M.I.E.E.

THERE is a somewhat surprising and important omission from the recently issued 1946 Supplement to the I.E.E. Wiring Regulations which so far has not been commented upon.

It will be recalled that the Ministry of Works Report, "Post-War Building Studies No. 11—Electrical Installations," in its recommendations to simplify and reduce the cost of socket-outlet wiring, advocates (in Paragraph 78 on page 19) as one of the new methods of wiring, not only the "ring circuit" but also the "room circuit" protected by a fuse with a current rating of 15 A. The Report further strongly recommends (Paragraph 72, pages 17 and 18) the provision of an adequate number of socket outlets, and actually suggests three of these both in living rooms and double bedrooms. It is clear, therefore, that the committee responsible for the Report had in mind the probability that however many socket outlets were installed in a *single* room, the maximum load in that room would never exceed 15 A, which is, of course, equivalent at 230 V to a 3-kW fire (in itself a most unlikely contingency, as usually a 2-kW fire is installed), plus 2 A over for portable lights, radio, vacuum cleaner, etc., and further, this could be wired, if desired, on a room circuit fused to 15 A.

Mr. Rawll was recently appointed electrical engineer and manager at Shoreditch

It was understood that one of the main purposes of issuing the 1946 Supplement was to give effect to the Report's recommendations, and it is, therefore, strange that, although the ring circuit proposal is covered and specifically mentioned, yet no actual mention is made of the room circuit. This means, therefore, that one must examine the I.E.E. Wiring Regulations, as now amended by the 1946 Supplement, to ascertain whether any of them permit the running of a single sub-circuit confined to feeding a number of socket outlets in a single room, i.e., a room circuit, and, if so, the conditions which are laid down for its installation.

Let us suppose one wishes to install, say, three socket outlets in an individual room, all to be wired on a single sub-circuit and to be protected by a fuse with a current rating of 15 A (i.e., a room circuit in accordance with the recommendations in the M.O.W. Report).

If, in such a case, it is proposed to utilize the present No. 546 B.S. 15-A socket outlet with non-fused plug, the 1946 Supplement would definitely not permit three of these to be installed on a single sub-circuit, but only one, however large the size of the cable used might be. The authority for this statement is that Reg. 201 (B) (i) limits the number of 15-A socket outlets to one should the rated capacity of the cable be 15 A, while should the rated capacity of the cable exceed that figure, Reg. 201 (C) also restricts the number of socket outlets to one, unless fused plugs of 13 A rating are used. A room circuit employing the present No. 546 B.S. 15-A socket outlets with non-fused plugs is, therefore, not permitted by the 1946 Supplement.

If, on the other hand, it is proposed to utilize the 13-A socket outlet with fused plug (i.e., the new standard all-purpose socket outlet, which is not yet available) and three of these are required to be installed in a single room, the 1946 Supplement permits this, but it would be necessary for the circuit to be wired with 7/·036 v.i.r. cable (Reg. 201 (C) (iii)). A 7/·036 v.i.r. cable is now rated at 29 A, and, as the circuit under consideration has only to deal with 15 A, insistence on this particular size of cable in these days of austerity is lavish to say the least. A 7/·029 v.i.r. cable would be quite sufficient, as this is now rated at 15 A. (Incidentally, had the Institution's War Emergency Relaxations, revoked by the 1946 Supplement, still been in force, even a 3/·036 v.i.r. cable would have been sufficient, as this was then rated at 15 A.)

As, according to Reg. 201 (C) (iv), the ring-circuit system can be adopted only if the new standard 13-A, all-purpose socket outlets with fused plugs are utilized, and the latter will not make their general appearance

for many months yet, it will be impossible to use this method of wiring at present where an adequate number of socket outlets are to be installed in a single room. Further, as a room circuit, for the reasons already given, utilizing the present No. 546 B.S. 15-A socket outlets with non-fused plugs is also not permitted for this purpose by the 1946 Supplement, the only alternative would be to wire each of the latter type of socket outlets on a separate circuit and thus vastly increase the costs of wiring. This becomes a serious matter, considering the large number of houses to be built in the immediate future.

For the above reasons, and particularly to reduce the cost of wiring, and having also in mind the present acute shortage of materials, accessories, etc., a further amendment to the I.E.E. Wiring Regulations should be made, viz.:—To permit the use of a room circuit supplying an unlimited number of socket outlets in a single room (whether of the present No. 546 B.S. 15-A type or new standard 13-A type) providing the wiring is carried out with not less than 7/·029 v.i.r. cable or 0·003 sq. in. mineral-insulated copper-sheathed cable, which is protected by a fuse with a current rating not exceeding 15 A.

It is earnestly to be hoped that in view of the importance and urgency of this matter, the I.E.E. Wiring Regulations Committee will take the necessary steps without delay to rectify this omission.

Swiss Foreign Trade

Exports and Imports Lower in 1944 than in 1938

THE Swiss authorities have now made available details of the country's foreign trade in 1944. The figures relating to the export of electrical goods are given in the first of the accompanying tables with a note of increase or decrease compared with 1938, which may be regarded as the last year of normal trade. It will be noticed that declines were shown in the majority of the groups, notably power plant and cables, with telegraph and telephone apparatus lower by 50 per cent. Exceptions to the decrease were accumulators, radio goods and some unspecified categories. There were many changes in the countries of destination. Germany and Spain were prominent as customers while there were noteworthy increases in shipments of electrical goods to Portugal, Sweden, Brazil and Argentina.

Swiss imports in 1944 were for the most part on a smaller scale than in 1938, declines having taken place in meters, telegraph and telephone material, power plant, equipment for vehicles, wires and cables. The only increases were in accumulators and rectifiers. Germany remained a leading supplier, though with a decline in several lines, and Sweden was a runner up.

In connection with the possibility of increasing the sales of British goods in Switzerland, the British Chamber of Commerce there, with its head office at Basle and a branch office at Lausanne, offers facilities for conducting market research in the country.

Exports

Class.	1944 Fr.(000)	Inc. or dec. on 1938
Accumulators—		
Total	598	+ 74
To Argentina	95	+ 91
„ Roumania	30	+ 30
„ Germany	356	+ 188
„ Slovakia	100	+ 100
Insulators—		
Total	242	− 109
To Germany	88	+ 86
„ Belgium	12	+ 8
„ Holland	98	+ 52
„ Denmark	14	+ 13
„ Sweden	10	+ 10
Meters and measuring instruments—		
Total	7,300	− 6,120
To Germany	1,881	+ 1,151
„ Spain	877	+ 841
„ Sweden	551	+ 322
„ Slovakia	1,237	+ 415
„ Cuba	313	+ 313
„ Brazil	469	+ 387
„ Argentina	392	+ 192
Glass rectifiers, with or without mercury—		
Total	12	− 31
Telegraph and telephone apparatus—		
Total	729	− 711
To Germany	378	+ 349
„ Spain	66	+ 66
„ Sweden	224	+ 191
Radio apparatus—		
Total	2,724	+ 2,172
To Spain	156	+ 156
„ Germany	597	+ 557
„ Portugal	215	+ 192
„ Sweden	260	+ 252
„ Turkey	638	+ 638
„ Iran	441	+ 441
„ Brazil	178	+ 178
Dynamo-electric machines—		
Total	18,277	− 3,130
To Germany	7,465	+ 6,609
„ Spain	5,579	+ 5,376
„ Portugal	1,371	+ 1,150
„ Denmark	411	+ 178
„ Slovakia	626	+ 172
„ Argentina	363	− 650
„ Brazil	715	+ 148
„ Roumania	244	− 399
„ Turkey	274	+ 105

Class.	1944 Fr.(000)	Inc. or dec. on 1938
Insulated wire and cable—		
Total	176	− 647
To Spain	95	+ 73
„ Sweden	32	− 36
Electric incandescent lamps—		
Total	693	+ 127
To Germany	627	+ 106
Lighting and starting equipment for vehicles—		
Total	5,872	+ 402
To Germany	3,529	+ 3,474
„ Sweden	1,797	+ 1,662
„ Spain	186	+ 186
„ Hungary	197	+ 185
Electric trucks—		
Total	322	+ 303
To Germany	92	+ 92
„ Slovakia	47	+ 47
„ Roumania	175	+ 175
Unspecified electrical apparatus, over 500 kg.—		
Total	2,380	− 1,281
To Germany	534	+ 454
„ Spain	1,130	+ 1,108
„ Portugal	178	+ 144
„ Sweden	124	+ 24
Ditto, 50 kg. to 500 kg.—		
Total	3,127	+ 459
To France	101	− 282
„ Germany	904	+ 845
„ Spain	905	+ 849
„ Portugal	110	+ 41
„ Argentina	154	+ 36
„ Sweden	304	+ 251
„ Roumania	126	+ 80
Ditto, 3 kg. to 50 kg.—		
Total	3,622	− 576
To Germany	1,474	+ 1,150
„ Spain	793	+ 754
„ Portugal	126	+ 84
„ Denmark	129	+ 79
„ Sweden	215	+ 130
„ Brazil	207	+ 144
„ Argentina	165	+ 5
Unspecified electrical apparatus, under 3 kg.—		
Total	1,852	+ 456
To Germany	868	+ 791
„ Slovakia	146	+ 97
„ Sweden	323	+ 295
„ Spain	112	+ 94
„ Brazil	34	+ 25
„ Argentina	49	+ 19

Imports

Class.	1944 Fr.(000)	Inc. or dec. on 1938
Accumulators—		
Total	603	+ 283
From Germany	223	+ 83
„ France	17	− 85
„ Sweden	360	+ 349
Insulators—		
Total	275	+ 52
From Germany	91	+ 8
„ Denmark	167	+ 85
Meters and measuring instruments—		
Total	720	− 699
From Holland	68	− 79
„ Sweden	32	+ 22
„ Italy	25	+ 11
„ Germany	504	− 342
„ Denmark	67	+ 64
Telephone and telegraph apparatus—		
Total	1,415	+ 1,059
From Germany	666	+ 109
„ Belgium	712	− 1,074
Radio apparatus—		
Total	5,921	− 18
From Germany	3,063	+ 1,030
„ Holland	1,088	− 597
„ Sweden	612	+ 520
„ Hungary	722	+ 552
Glass rectifiers, with or without mercury—		
Total	235	+ 202
From Germany	155	+ 155
„ Holland	74	+ 60
Unspecified electrical apparatus, over 500 kg.—		
Total	7	− 76
From Germany	7	− 13
Ditto, 50 kg. to 500 kg.—		
Total	189	− 70
From Germany	178	+ 89
„ Sweden	11	+ 10
Ditto, 3 kg. to 50 kg.—		
Total	122	− 455
From Germany	89	− 132
„ Sweden	31	+ 26
Ditto, under 3 kg.—		
Total	978	− 40
From Germany	677	− 73
„ Holland	80	+ 63
„ Sweden	36	+ 26
Dynamo-electric machines—		
Total	1,400	− 648
From Germany	1,200	+ 411
„ Sweden	63	+ 30
„ Italy	50	− 119
„ Holland	50	− 97
Lighting and starting equipment for vehicles—		
Total	452	− 894
From Germany	400	− 475
„ Italy	20	+ 20
Insulated wire and cable—		
Total	84	− 947
From Germany	41	− 489
„ Slovakia	15	+ 5
„ Belgium	22	− 229
Electric incandescent lamps—		
Total	1,847	− 549
From Germany	482	− 70
„ Holland	729	− 382
„ Hungary 46	5	+ 104

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Hungary.—A Budapest agent wishes to get into touch with manufacturers of radio accessories, mica, micanite, asbestos, nickel-chrome and other resistance wire. (X. 151.)

China.—Concern returning from Mauritius to Shanghai or Hongkong asks to be put into touch with British electrical manufacturers. It is proposed to retain the Mauritius establishment as a branch office. (X.152.)

British Plastics Industry

Speeches at Federation's Luncheon

THE British Plastics Federation held its annual luncheon on April 10th at the Savoy Hotel, London. The LORD MAYOR OF LONDON was present and responded to the toast of "The Lord Mayor, the Sheriffs and the Corporation of the City of London," proposed by the chairman, MR. H. W. GRAESSER-THOMAS.

The toast of the guests was also proposed by the chairman and in the course of his speech he referred to the strengthening of the Federation by the formation of a Raw Materials Group whose interests covered a wide variety of products. Dealing with the importance of raw materials, Mr. Graesser-Thomas spoke of the part which they had played in the development of radar and other wartime achievements, with special reference to polythene, polyvinyl-chloride and wood laminated plastic material. Plastics had been of considerable importance to the great electrical industry.

The speaker said that during the war 95 per cent. of the total plastics production had been devoted to the furtherance of the war effort and so it could be imagined what a terrific transition problem now faced members of the industry.

MR. OLIVER LYTTELTON, who replied to the toast, said that he was glad to learn that the Federation was maintaining close contact with the Council of Industrial Design, a matter of great importance. We were entering a new industrial and scientific era in which some economists believed we should in a hundred years overcome all the material difficulties which had assailed the human race since its birth. It was a saddening spectacle to contrast the growth of human knowledge in the material field with the little progress which had been made in man's relations with his fellow men.

He believed that we were indeed not far away from solving all our material problems and we must seriously consider how increased leisure was to be employed and how the human race could live together in reasonable peace. Wonderful devices had been produced but it was ridiculous to use these products of the 20th century with 19th century minds.

SIR JOHN WOODS, Permanent Secretary, Board of Trade, proposed the toast of the Federation and in doing so spoke of the value of industrial organizations in bringing before Government Departments the needs of each industry. He hoped that the members would regard the Board of Trade as a human department existing to help industry and anxious to increase its contacts with industrial leaders.

MR. W. C. WAGHORNE replied to the toast and emphasized the fact that the plastics industry was a feeder of other industries, notably the electrical industry. It should be remembered that though plastics requirements sometimes seemed small the industry was supplying essential components to other industries producing goods which were often of very high export value.

Nature of Membership

The annual report shows that the membership of the Federation totalled 259 at December 31st, 1945. These are organized in the following groups:—Plastic material manufacturers (27), in three sections; moulders (129) in six sections; laminated and fibrous products (13); fabricators (40) in two sections; engineers (48) in four sections; and raw material suppliers (26).

Forthcoming Events

Tuesday, April 23rd.—*Glasgow.*—Royal Technical College, George Street, 6.15 p.m. I.E.E. Scottish Centre. "Mineral Insulated Metal-Sheathed Conductors," by F. W. Tomlinson and H. M. Wright.

Thursday, April 25th.—*London.*—Kingsway Hall, 6 p.m. Thirty-seventh Kelvin Lecture. "Nuclear Physics and the Future," by Prof. M. L. Oliphant.

Swansea.—I.E.E. Western Centre. Joint meeting with the West Wales (Swansea) Sub-Centre. "Mineral Insulated Metal-Sheathed Conductors," by F. W. Tomlinson and H. M. Wright.

Saturday, April 27th.—*Huddersfield.*—Electricity Department Showrooms, 2.30 p.m. I.E.E. North Midland Students' Section. "The Diverse Types of Medium Range Induction Motors, and their Characteristics," by R. Spence.

Monday, April 29th.—*Bristol.*—I.E.E. Western Centre. "The Place of Radiant, Dielectric and Eddy Current Heating in the Process Heating Field," by L. J. C. Connell, O. W. Humphreys and J. L. Rycroft.

Tuesday, April 30th.—*London.*—Geological Society, Burlington House, W.1, 10 a.m. Institute of Fuel. One-day conference on "Industrial 'Waste Heat' Recovery."

Manchester.—Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre (Transmission Group). "Protective Systems for Rural Distribution up to 33 kV" by D. C. Field; "Protective Systems for Supply Networks operating at Voltages up to 11 kV," by O. Howarth; "Protective Systems for Rural Distribution up to 33 kV," by R. W. Steel and A. W. Allwood; "Auto-Selective Isolation of Sustained Earth Faults on a Network Protected by Petersen Coils," by K. I. Brown.

Thursday, May 2nd.—*Dublin.*—Institution of Electrical Engineers (Irish Centre). Repeat of Faraday Lecture on "Atoms, Electrons and Engineers" by Dr. T. E. Allibone.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Associated Electrical Industries, Ltd.—A large part of the speech by the chairman (Mr. Oliver Lyttleton) at the annual meeting last week was concerned with the war activities of the group of companies. First he spoke of the number of employees serving in the Forces which at the peak was approximately 10,000, of whom 354 men gave their lives and 100 were still missing. The number of those who had been demobilized and who had returned to the companies' service, including repatriated prisoners of war, was no more than 1,285.

During the war the total number of employees reached a maximum of 70,000 and at one time no less than 40 per cent. were women, to whose work he paid a tribute. Serious damage by enemy action inflicted at Trafford Park (December, 1940), Sheffield and elsewhere cost £1,500,000 to repair but happily human casualties were light. War production totalled some £215,000,000, but the contribution of their research departments and technical and manufacturing engineers could not be measured in money. They played decisive parts in four important new developments, namely, radar, gun control, jet propulsion and atomic energy, and he described the activities of the individual companies in this connection.

Turning to the future, he said that the world had entered a new scientific and industrial era. Its horizons were continually expanding and in no field would more startling developments be seen than in the electrical industries. He thought it might well be that one of the simplest and most revealing indices of a country's industrial life and vitality would be the amount of electric power generated per head of the population. On the question of reconversion, he said that the problems facing their group, though serious, were not on the whole so fundamental as those confronting other industries, for the electrical industry necessarily played a large part in the war. They were now carrying on large-scale manufacture in a greater number of industrial centres than before the war, thus fulfilling the policy of taking the work to the workers. They had a record order book and in 1945 their export business, which had been severely cut in the interests of war production, increased by nearly 100 per cent over the 1944 figure. Present difficulties in making their greatest efforts to expand exports were mainly due to shortage of labour.

The chairman went on to speak of the importance of research and their proposal to establish a laboratory devoted exclusively to long-term research under the auspices of the parent company, A.E.I. A recent example of the fruits of their research was the first British "Betatron" made at Trafford Park for the production of a 20-million-volt X-ray beam. He also spoke of the provision made by the group of companies for staff education.

In dealing with the accounts, Mr. Lyttelton announced that, provided the operating companies continued to earn profits at the same level as at present, the directors proposed to consider the possibility of paying interim dividends in future.

At a subsequent extraordinary general meeting special resolutions were passed approving the increase of capital to £8,696,050 and the conversion of the additional shares into stock; details of these were given in a letter issued wth the annual report (*Electrical Review*, April 12th, p. 590).

Telegraph Construction & Maintenance Co., Ltd.—Reviewing the accounts at the company's annual meeting Lord Colgrain, the chairman, explained that the large decrease in trading profit was due to the sudden cessation of the war and the consequent cancellation of nearly a million pounds' worth of war contracts. They were, however, adapting their work to peacetime conditions and looked forward with confidence to the future. After giving a résumé of the company's war activities and mentioning that the production figure amounted to £9,000,000 he referred to the raising of further capital last July the need for which, he said, lay in the fact that they would have to face very heavy expenditure during the next year or two in the replacement of obsolete plant and in the purchase of equipment for the development of both their cable and metal departments.

Switchgear & Cowans, Ltd. — Mr. H. Burroughes (chairman) stated at the company's annual meeting that the shortage of man-power presented the greatest difficulty with which they had to contend at the present time, and until this was overcome they would be gravely handicapped. Taking a longer view, the directors felt that they could look forward to the future with confidence. New designs were continually being evolved and brought into production.

Engineering Components, Ltd.—The accounts for 1945 show a fall in the combined trading profit from £124,865 to £62,728, but E.P.T. takes only £2,191 (against £58,120) and income tax £23,712 (£28,488) and after deducting depreciation, fees, etc., the net profit is £26,588 (£26,204), of which £5,460 (£5,732) is retained by subsidiaries. The final ordinary dividend is 15 per cent, again making 25 per cent for the year, and £21,413 (£19,098) is carried forward.

Scottish Power Co., Ltd.—In his speech at the annual meeting last week Mr. W. Shearer (chairman) announced that the company had decided to reduce the lighting flat rate to domestic consumers throughout the whole of its area—comprising some 13,000 sq miles—from 6d. to 4½d. per kWh, with effect from the first of the month. These and other reductions since 1943 alone represented a saving to consumers of between £180,000 and £200,000 per annum. Last year, excluding bulk supplies to authorized undertakings outside their group, and the Central Electricity Board, the average price from their general business was as low as 1·4d. Including bulk supplies, the average price obtained was 1·04d.

The maximum demand on their plant in 1945 was 132,206 kW, the connected load 370,612 kW and the total sales 475 million kWh, the last-

named figure being an increase of 7 million kWh on the previous year. The C.E.B. took under contract 129 million kWh, or 28 per cent of the total. The output of the Grampian Company, which varied with the annual rainfall and its seasonal incidence, represented approximately 63 per cent of the total sales. It was hoped to complete the installation of a second 20,000-kW unit in the Bonnybridge station of the Scottish Central Electric Power Co. in time for next winter's load. Continuing the process of eliminating the smaller undertakings in their areas, the Special Order of the Elgin Co. was transferred to the Grampian Co. during the year, the Elgin Co. being liquidated.

In the course of his speech Mr. Shearer reiterated the views on nationalization expressed to other supply companies with which he is associated. He contended that in their group of companies they had every reason to be satisfied with the achievements of private enterprise.

The Automatic Telephone & Electric Co., Ltd., reports profits for 1945 amounting to £658,304 (against £503,240 for 1944) from which are deducted E.P.T. £320,057 (£203,440), directors' fees £2,279 (£2,453), depreciation £75,894 (£67,418) and income tax on 1945 profits £138,381 (£128,907). A sum of £18,000 is transferred to reserve (last year £30,000 was allocated to war contingency reserve). It is proposed to pay a final ordinary dividend of 7 per cent (making 10 per cent) plus a bonus of 2½ per cent, the same as last year, and the deferred dividend is also unchanged (10 per cent plus a bonus of 2½ per cent). The carry-forward is raised from £124,934 to £150,852.

A. Reyrolle & Co., Ltd.—The accounts for 1945 show a net profit of £96,701, compared with £114,771 for 1944, after providing £110,000 (£125,000) for taxation. There is this year no allocation to general reserve, which last year received £40,000. The dividend on the ordinary stock is unchanged at 12½ per cent and £120,917 (£119,411) is carried forward.

The Ever Ready Trust Co., Ltd.—Besides maintaining the ordinary and deferred dividends at 10 per cent by final payments of 7 per cent it is proposed to distribute a "victory bonus" of 2 per cent on both classes of shares; this will be paid out of current revenue together with £2,782 from undivided profits brought forward. The revenue balance for 1945-46 was £33,218 (against £31,834).

The Telegraph Condenser Co., Ltd., reports a net profit for 1945 of £68,653 (against £63,731 for the preceding year) of which income tax absorbs £34,150 (£35,413). The ordinary dividend is maintained at 7½ per cent while the cash bonus is raised from 2½ to 5 per cent. After applying £18,800 (£16,200) to reserve £40,402 (£38,919) is carried forward.

Pinchin, Johnson & Co., Ltd., are increasing their final dividend on the ordinary shares from 7½ to 12½ per cent, making 15 per cent (against 10 per cent) for the year. The net profit is given as £552,381, compared with £526,666 for 1944.

The Skefco Ball Bearing Co., Ltd.—From a net profit of £130,916 for 1945 (against £180,594 for 1944) it is proposed to pay a final dividend of 10⅞ per cent free of tax; this makes 15⅜ per cent (against 17½ per cent) tax free for the year.

The Woking Electric Supply Co., Ltd., has declared a final dividend of 4½ per cent tax free making 7½ per cent tax free for the year (same).

Pye (Ireland), Ltd., proposes to pay a first and final dividend of 7½ per cent, the same as last year.

New Companies

B.C.S. Electrics, Ltd.—Private company. Registered March 18th. Capital, £1,000. Objects: To carry on the business of electrical and general engineers, etc. Directors: E. Billington, 19, Crosby Road, Leeds, and two others. Registered office: Turks Head Yard, Briggate, Leeds, 1.

Richardsons Electrical, Ltd.—Private company. Registered March 13th. Capital, £5,000. Objects: To carry on the business of wholesale and retail dealers in, and vendors of, electrical goods and appliances, etc. Subscribers: W. F. W. Richardson and Mrs. Clara Richardson, both of 373, Regent's Park Road, Finchley, N.3, which is the registered office.

A. R. T. Neon Co., Ltd.—Private company. Registered March 15th. Capital, £2,000. Objects: To carry on the business of electric sign constructors, erectors and dealers, electrical, radio and general engineers, etc. Subscribers: B. L. Robinson, 91, Havelock Street, and C. C. Tivers, 30, Victoria Street, both Kettering. Registered office: 8a, Regent Street, Kettering.

March (Electrical Contractors), Ltd.—Private company. Registered March 1st. Capital, £1,000. Objects: To carry on the business of electricians, electrical, wireless, motor and mechanical engineers, etc. Directors: E. J. Newmarch, 125, The Heights, Northolt Park, Greenford, Middlesex, and two others. Registered office: 1, Stratford Road, W.8.

Miller & Webb, Ltd.—Private company. Registered March 5th. Capital, £100. Objects: To carry on the business of electricians, radio and radar engineers, mechanical and electrical engineers, etc. Directors: W. M. Webb, 90, The Walk, Potters Bar, Middlesex, and A. E. Miller, 66, Crescent Road, New Barnet. Registered office: 66, Crescent Road, New Barnet, Herts.

Modernlite, Ltd.—Private company. Registered March 6th. Capital, £1,000. Objects: To carry on business of electrical, mechanical, radio and general engineers, specialists in neon lighting and signs and electronic and radio equipment, advertising agents, etc. Subscribers: B. Leigh, 80, Clarewood Court, Crawford Street, W.1, and H. Izernikoff, 37, Tudor Gardens, W.3. Registered offices Room 7, 107-115, Long Acre, W.C.2.

Harry Ward, Ltd.—Private company. Registered March 21st. Capital, £5,000. Objects: To acquire the business of an electrician, wireless engineer, etc., carried on by H. Ward at The Green, Bournville, Birmingham, 30. Directors: H. Ward, 25, Sycamore Road, Bournville, and two others. Registered office: 25, Sycamore Road, Bournville, Birmingham, 30.

Liquidations

Electrical Facilities, Ltd.—Winding up voluntarily. Liquidator, Mr. P. Ewan, 17, St. Helen's Place, Bishopsgate, E.C.3, appointed April 3rd.

STOCKS AND SHARES

BUSINESS in the Stock Exchange markets was greatly stimulated by the effect of the Budget, with its encouragement for gilt-edged stocks and its hopefulness in regard to industrial companies of most kinds. Amongst industrials, gains of material amounts occurred, and, although there was a little profit-taking that served to check the exuberance, prices nevertheless held the greater part of the gains they previously secured.

Amongst the gilt-edged stocks dealt with in our price-lists, London Electric Transport 2½ per cent has hardened to 100. London Passenger Transport issues are nominally without alteration, but they are difficult to buy at anything like the quoted prices. The speculative "C" stock is 4 points up at 60. The deferred stock of British Electric Traction has put on 70 points at 1,145. Southern Railway Preference at 111½ and the preferred at 76 are both better.

Home Electricity Supply

The electricity supply market was one of the few round the Stock Exchange which had regarded the Budget outlook with composure. Therefore, upon the details becoming known, prices in this group hardly moved.

The companies have been able to maintain their distributions by reason of sound and conservative management in the past. Substantial reserves have been built up, and in spite of the burdens laid upon industry by war taxes, the electricity supply companies were well equipped to meet demands without difficulty. Thanks to this policy of caution, the companies can face the transition period, from war to peace, with a composure unruffled by the likelihood of there being any material cuts in dividends. London Associated Electrics regained, at 26s. 6d., the slight loss of last week.

Miscellaneous Movements

De la Rue at 11⅛ are up 8s. 9d., Ericssons 3s. 9d. at 55s., English Electrics 3s. at 55s. 6d., and Murex 2s. 6d. at 95s. General Electrics at 98s. are 4s. higher and Metal Industries "B" at 52s. have gained a florin. Smaller advances made Brush 12s. 3d., Ever Ready 49s., Siemens 41s. 6d., General Cable 18s. 6d., London Electric 41s., Thorn Electrics 33s., Telephone Manufacturing 14s. 3d., Telephone Rentals 13s. 3d. and Allen West 9s. In the communications list, Cable & Wireless preference and ordinary are better at 112, and 97 respectively, Globe Ordinary hardening in sympathy to 42s. 6d., Marconi Marines are up 1s. 6d. at 35s. and Oriental Telephones 1/16 to 58s. 9d. Associated Electrical at 63s. have risen 4s.

Cable Manufacturers

British Insulated Callender's Cables shares have been showing increasing firmness as the time approaches for the first dividend declaration since the amalgamation. At 46s. 9d. the price is near the highest of the year. Shareholders in the individual companies received interim dividends of 10 per cent in each case last June. The market does not commit itself to a closer estimate of the combine's dividend than a forecast of between 8 and 10 per cent for the year. Telegraph Construction & Maintenance eased off to 56s., to harden to 57s. after publication of the accounts. On the 10 per cent dividend the yield is £3 10s. per cent.

Dividends and Reports

Automatic Telephone & Electric is again paying 10 per cent on the ordinary shares, plus 2½ per cent bonus for the year. The same distribution has been made annually since 1938. At 70s. the shares are on a yield basis of £3 11s. 6d. per cent. Trading profits are reported to be up by more than £150,000, at £658,000. Out of this the company is providing £320,000 for E.P.T., or more than £100,000 above the previous year's figure.

Telegraph Condenser has maintained the dividend of 7½ per cent, but the additional cash bonus is raised this time from 2½ to 5 per cent. On the total distribution of 12½ per cent, the yield on the 10s. shares at 25s. works out to 5 per cent. Profits show a useful expansion, and with little change in the charges the company is also able to increase the transfer to reserve.

Television

Coming among other market distractions, the news that the June 8th victory celebrations are to be broadcast by television from Alexandra Palace went without immediate effect in the market concerned. To that, a noticeable exception was provided by the volatile Scophony shares, which picked up from 9s. to 14s. in the course of a few days, and in the Budget boomlet, E.M.I. put on 3s., rising to 35s. 6d. Pye deferred held their previous advance to 40s. Decca Records at 63s. 9d. are up 3/16, thanks to the coming reduction in purchase tax. Cossor show no change at 41s.

Outlook for Vactric

Notification of the Vactric company that the position does not justify any distribution for 1945 on the ordinary capital was compensated by the published explanation of the decision. For some time the price of the 5s. shares has reflected the anticipation of a cut in the rate of 22½ per cent paid for 1944. From 24s. 6d. earlier this year, the quotation had declined to 18s. 9d. a week ago. After dropping momentarily to 15s. nominal, the price rebounded to 21s. The absence of a dividend is due to the inevitable hiatus in production, while changing over from war to peace activities, aggravated by the transfer of the business to Scotland under the B.O.T. redistribution of industry scheme. Production, however, is shown to be already more than double the pre-war figure.

ELECTRICITY SUPPLY

Grimsby Rural Extensions. Change-over at Hove.

Brighouse.—CHARGES IN ADDED AREAS.—In the report of the Electricity Committee presented to the monthly meeting of the Town Council, reference was made to a letter from the Electricity Commissioners on the question of electricity charges at Hipperholme and other added areas. The Commissioners stated that they were unaware of any legal authority which would permit the Corporation to make financial compensation to the Electrical Distribution of Yorkshire, Ltd., if the company charged its consumers in the added areas the same price as the Corporation ; that the fact that parts of the company's area were included in the borough of Brighouse did not constitute an adequate reason why the charges should be uniform with those of the Corporation ; and that in view of the Government's nationalization proposals no useful purpose would be served by pursuing the matter.

The Electricity Committee further reported that a sub-committee had been appointed to discuss with Morley and other neighbouring authorities the question of taking some concerted action to procure uniform tariffs throughout their respective local government areas.

Burnley.—ELECTRICITY FOR COTTON MILLS.—The Electricity Committee has been asked by the Master Cotton Spinners' Association if it is prepared to fix a special reduced scale of charges for the supply of electricity to cotton mills and has promised to consider the matter when the revision of charges is under discussion.

Carlisle. — HIRE-PURCHASE SCHEME. — Proposals by the city electrical engineer which have been approved by the Electricity Committee provide for the inauguration of a long-term hire-purchase scheme covering the more expensive types of apparatus, such as cookers, wash-boilers and water heaters. Terms for the hire-purchase of cookers will be the list price of the cooker and control unit plus 50 per cent to cover maintenance and the cost of the supply cable, the total charge being divided into 40 equal quarterly payments.

Colchester.—TARIFF ALTERATIONS.—Subject to consent being obtained, electricity charges are to be consolidated to include the present 15 per cent general increase and, in the extended area, the 10 per cent distribution charge. Meter rents are no longer to be payable by consumers taking a supply on the domestic tariff. The changes are to take effect on June 1st.

Finchley.—ROAD LIGHTING UNIFORMITY.—A scheme to co-ordinate the public lighting is being jointly considered by Hendon and Finchley Borough Councils. The latter has adopted new type standards on all roads, and wants neighbouring boroughs to achieve uniformity especially on heavily trafficked roads.

Gravesend.—STAFF REORGANIZATION.—The Electricity Committee recommends the Council to adopt the proposals of the borough electrical engineer (Mr. G. V. Harrap) relating to the reorganization of the staff of the undertaking. The station is at present in Class F, but it is expected that with the present rate of increase in output there may be a reclassification to Class G in a year or two. About 93 per cent of all premises in the area of supply are now connected. The average domestic consumption is 1,724 kWh per annum, against the national average of 629 kWh; roughly one domestic consumer in four has a cooker and one in six a water heater.

Grimsby.—HIRE OF APPARATUS.—At its April meeting the Electricity Committee authorized the re-introduction of the hire scheme for domestic electrical appliances, including cookers.

RURAL PLANS.—The Electricity Committee has instructed the electrical engineer to report on a proposed £14,000 scheme for supplying electricity to certain villages in the Louth rural district. Also under consideration is a second portion of the proposed scheme, covering the district up to Withern and estimated to cost approximately £30,000.

Hove.—PROPOSED REBATE.—Having been informed that the net profit for the year is likely to be £14,815, the Electricity Committee recommends a rebate of 20 per cent on March quarter accounts.

CHANGE-OVER.—The Electricity Committee is to proceed with the change-over at a cost of £119,048, details of the scheme being as follows: Three new substations and additions to existing substations £14,800; e.h.v. feeders in connection with new substations £4,030; l.v. mains £50,218; a.c. meters £14,000; and changing consumers' appliances £36,000.

Newburgh (Fife).—DOMESTIC EQUIPMENT.—To guarantee a return upon the expenditure involved the Fife Electric Power Co. made a condition that all cooking in permanent housing schemes should be by electricity; that electric wash boilers should be installed; and that at least one electric point should be provided in each room. The Council has unanimously agreed to these conditions.

South Wales.—SEVERN BARRAGE SCHEME NEEDED.—A deputation representing the local authorities in South Wales recently met the Welsh Parliamentary Party to discuss the question of electric power production. It was stated that all power stations are working to capacity and new stations will not meet the full requirements of South Wales. The Party is to urge upon the Government the need for a Severn Barrage Scheme.

POWER PROJECT OPPOSED.—Monmouthshire County Council, at a recent special meeting decided to oppose the proposal of the South Wales Electric Power Co. to erect a power station at Llanover.

Watford.—REDUCED COST OF EXTENSION.—In January the Council decided to construct a new 33,000-V line from the generating station to serve the area towards Hemel Hempstead, and an expenditure of £60,000 over a three-year period was approved. Subsequently it was learned that the Central Electricity Board had some transformers and switches which would meet the Council's needs at much lower cost. This apparatus was being offered to UNRRA, but the Council's chief engineer secured an option on four transformers and ten switches.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. *each*) *may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

AKT. Ges. Brown, Boveri & Cie.—"Gas-blast circuit breaker with resistance." 959/44. January 18th, 1943. (576345.)

R. S. Antrobus.—"Sockets for electric lamps, bulbs or the like." 1388. January 25th, 1944. (576346.)

C. F. Bell.—"Electrical fittings." 7687. April 25th, 1944. (576323.)

British Insulated Cables, Ltd., J. C. Quayle and P. Jones.—"Arrangement of a thermo-couple for use in connection with high frequency electric heating apparatus." 5334. March 22nd, 1944. (576366.)

British Thomson-Houston Co., Ltd.—"Insulating and dielectric compositions." 2542/43. February 25th, 1942. (576304.) "Electron discharge devices and lens systems therefor." 5605/44. March 31st, 1943. (576369.)

British Thomson-Houston Co., Ltd., and H. de B. Knight.—"Vitreous seals." 7916. April 27th, 1944. (576251.)

A. F. Burgess (Zenith Radio Corporation).—"Antennæ assemblies." 3187. February 21st, 1944. (576322.)

Chloride Electrical Storage Co., Ltd. (R. F. Murphy).—"Plates of electric accumulators." 15370. August 11th, 1944. (576324.)

Ferranti, Ltd., and J. A. Darbyshire.—"Electric fuses." 5848. March 30th, 1944. (576297.)

General Electric Co., Ltd., H. C. Turner and J. F. Veevers.—"Multi-range electrical measuring instruments." 409. January 8th, 1943. (576303.)

W. T. Gray and Metropolitan-Vickers Electrical Co., Ltd.—"Self-propelled vehicles." Cognate applications 10871/40, 12747/40 and 3664/41. June 25th. 1940. (576300.)

Keith Blackman, Ltd., and D. S. Woodley.—"Flexible couplings." 812. January 15th, 1944. (576343.)

Londex, Ltd., and A. P. Besson.—"Method of and means for controlling the level of a liquid which is an electric conductor." 1242. January 22nd, 1944. (576278.)

J. McDonald, A. Finlayson and G. W. B. Electric Furnaces, Ltd.—"Furnaces." Cognate applications 18100/43 and 19515/43. November 2nd, 1943. (576331.)

Marconi Instruments, Ltd., W. B. Bartley and C. F. Brockelsby.—"Electrical testing and measuring apparatus and in methods of effecting electrical tests and measurements." 892. January 17th, 1944. (576344.)

Marconi's Wireless Telegraph Co., Ltd.—"Electron discharge valve amplifiers." 1092/44. January 20th, 1943. (576277.)

Mavor & Coulson, Ltd. (Joy Manufacturing Co.).—"Self-propelled vehicles, particularly for use in mines." 5530. March 24th, 1944. (576368.)

Modinstal Electric Co., Ltd., and E. C. Malins.—"Infra-red heat generators." 5612. March 27th, 1944. (576370.)

Radio Gramophone Development Co., Ltd., and S. T. Bolus.—"Gramophone pickups." 2213. February 7th, 1944. (576349.)

S. Smith & Sons (England), Ltd., and F. W. Meredith.—"Electric motors." Cognate applications 21944/43 and 1584/44. December 31st, 1943. (576248.) "Electric motors." Cognate applications 21945/43 and 17228/44. December 31st, 1943. (576249.) "Electric generators." 2744/44. March 14th, 1944. (576351.)

Soc. Anon. des Industries Radio-Electriques S.A.D.I.R.—"Radio aerials." 2232/42. March 28th, 1941. (576360.)

Specialties Development Corporation.—"Electrical impact switch." 8450/44. August 27th, 1943. (576260.)

Standard Telephones & Cables, Ltd.—"Annular detachable couplings." 779/44. February 6th, 1943. (576342.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—"Printing telegraph system." 3055. February 18th, 1944. (576352.)

A. V. Tomlinson (Union Switch & Signal Co.).—"Apparatus for regulating the flow of electric current from and into a battery connected across a load in parallel with a rectifier." 16064. September 30th, 1943. (576328.)

H. A. N. White (trading as Nolos Distributing Co.).—"Electric heating of washing machines or wash boilers." 3468. February 24th, 1944 (576288.)

Scientific Instrument Makers

BRITISH scientific instrument makers are to exhibit their products in the Technical Museum, Stockholm, from May 24th to June 4th, under the joint auspices of the Scientific Manufacturers' Association of Great Britain, Ltd., and the Royal Institute of Scientific and Engineering Research of Sweden. Forty British manufacturers will show examples of their latest instruments, and a display of photographs and historical instruments has been arranged with the co-operation of the British Council. A special feature of the Exhibition will be daily demonstrations and lectures by scientific experts of the various firms. Prominent British scientists, including Sir Charles Darwin, Director of the National Physical Laboratory, and Mr. F. H. Rolt, O.B.E., Director of Metrology at the N.P.L., will be among the lecturers.

British manufacturers of scientific instruments have responded generously to an appeal for funds for the rehabilitation of Europe's devastated laboratories. A fund was initiated in memory of the late Sir Horace Darwin, F.R.S., for the provision of instruments to re-equip laboratories in enemy-occupied territories; and twelve member firms of the Scientific Instrument Manufacturers' Association of Great Britain have already promised instruments to the value of £3,300.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Ashton-under-Lyne.—May 6th. Electricity and Public Lighting Committee. One petrol-driven, or alternatively, one electrically-driven chassis, equipped with 25-ft. collapsible tower suitable for maintenance of street lighting. (April 12th.)

Birmingham.—May 9th. Electric Supply Committee. Cables, switchgear, conduits, protective covers and jointing compounds for twelve months. (April 12th.)

East Grinstead.—April 29th. U.D.C. Supply, delivery and laying of e.h.v. and l.v. cables. (See this issue.)

Edinburgh.—May 10th. City Council. 33-kV transformer and reactors. (See this issue.)

Farnworth.—April 23rd. Electricity Department. Cables, overground and underground boxes, transformer, switchgear, distribution boards and meters. (April 12th.)

North of Scotland.—April 29th. Hydro-Electric Board. April 29th. H.v. and l.v. overhead lines in Island of Islay, Argyllshire. (April 5th.)

May 2nd. H.v. and l.v. overhead lines and underground cables in Millport, Island of Great Cumbrae, Buteshire. (April 5th.)

Plymouth.—May 4th. Electricity Supply Dept. 33,000-V cables, joint assembly units and auxiliary pilot cables. (April 12th.)

Pudsey.—April 30th. Electricity Department. Electric cookers, washboilers, washing machines and fires for twelve months. (April 12th.)

Sheffield.—June 3rd. Electricity Department. Steam generators together with all associated equipment for the Neepsend generating station. (April 5th.)

May 13th. Two oil-immersed, copper shielded reactors. (April 12th.)

Orders Placed

Bradford.—Gas Committee. Accepted. Electric lighting installation at gasworks (£2,046).—J. Carter.

Electricity Committee. Accepted. Extension and modification of ash handling plant at Valley power station.—International Combustion. Fuse pillars.—B.I. Callender's Cables.

Chesterfield.—Electricity Committee. Accepted. Cables (£5,380).—Aberdare Cables; transformers, two 150-kVA (£197 each) and four 250-kVA (£279 each).—Ferranti; switchgear (£1,913).—Ferguson, Pailin.

Edinburgh. — Public Utilities Committee. Recommended. Switchgear for three main sections of switch-house at Portobello (£175,102). Ferguson, Pailin.

Hove.—Electricity Committee. Accepted. Two 11-kV switch panels (£501 each).—Switchgear & Cowans. Nine 500-kVA three-phase transformers (£391 each) and one 200-kW mercury arc rectifier (£1,536).—Electric Construction Co.

Lichfield.—Electricity Committee. Accepted. One 6,000-kVA transformer (£5,225).—British Electric Transformer Co. 11-kV switch with protective relays (£1,827).—Ferguson, Pailin.

Middlesex.—Health Committee. Recommended. Electrically heated food trolleys (£1,590).—Manor Electric Oven & Fire Co.

Southwark.—Electricity Committee. Recommended. 300-kVA transformer (£296).—British Power Transformer Co.

Westminster.—Libraries Committee. Accepted. Fluorescent lighting at St. Martin's Street Library (£190).—T. Clarke & Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Adwick-le-Street.—Houses (48), for U.D.C. W. S. Ellis, surveyor, Council Offices.

Ashby-de-la-Zouch.—Permanent houses (50), Westfields estate; L. Swanwick, architect, 44, London Road, Coalville, Leicester.

Beckenham.—Houses (118), Balmoral Avenue and Beck Lane; J. Dove, borough engineer, Town Hall.

Birmingham.—Bus depot, Quinton (£119,000); city engineer.

Blackpool.—Houses (22), Grange Park estate (£25,467); J. & R. Fenton, Ltd.

Showrooms and offices, Devonshire Road; Hardisty & Miller, Ltd.

Brecon.—Permanent houses (64), Llanfaes; A. J. Hayes & G. H. Griffiths, architects, 98-100, Queen Street, Cardiff.

Brighouse.—Permanent houses (50), Stony Lane, Lightcliffe; H. A. Sneezum, borough engineer, Commercial Street.

Burnley.—Shops and houses, Cog Lane and Rossendale Road; Hitchon & Pickup, architects.

Canterbury.—Houses (126), Martyrs' Fields; L. H. Wilson, city architect, Municipal Buildings.

Chelmsford.—Houses (44), Springfield Park; borough engineer.

Chesterfield.—Cubicle block, Penmore Hospital (£12,000); W. S. Wilson, borough surveyor.

Cockenzie and Port Seton.—Houses (32), for Town Council; C. W. H. Anderson, Town Clerk, Council Chambers.

Coulsdon and Purley.—Houses (156), Tollers Lane (£183,323); Walker (Tooting), Ltd., Beddington Lane, Croydon.

Coventry.—Central library on the Gulson Library site (£12,820); D. E. E. Gibson, city architect, 1a, Warwick Row.

Cuckfield.—Permanent houses (106), for R.D.C.; A. Hutchings, surveyor, Boltro Road, Haywards Heath.

Dartford.—Estate development, Rochester Way; Victor Kerr & Colbourne, architects.
Crematorium; borough engineer.

Derwent.—Factory, Hull Road; Derwent Plastics, Ltd.

Dorchester.—Houses (38), Windsor Road; L. Magnus Austin, architect, 28, High Street East.

Elstree.—Houses (28), Newcome Road, Shenley for R.D.C.; A. Lancashire, clerk, 16, Shenley Road, Boreham Wood, Herts.

Farnham.—Houses (60), for U.D.C.; A. A. Minns, clerk, South Street.

Frimley and Camberley.—Permanent houses (32), Mytchett, for U.D.C.; A. L. Farman, architect, 42, Richmond Park Road, London, S.W.14.

Gainsborough.—Permanent houses (40), Corringham Road, for U.D.C.; S. Algar, surveyor, U.D.C. Offices, Lord Street.

Greenock.—Houses (322); master of works, Municipal Buildings.
Electrical and heating work, Larkfield Hospital; Wright & Kirkwood, architects, 26, Blythswood Square, Glasgow.

Henley.—Houses (58), for R.D.C. (£68,211); G. P. Trentham, Ltd., contractors, 63, New Oxford Street, W.C.1.

Hereford.—Houses (240), Council estates; E. T. Wraight, quantity surveyor.

Huddersfield. — Houses (36), Brackenhall estate; H. May (Builders), Ltd., Chapel Hill.

Hull.—Extensions, De La Pole Hospital (£51,500); city architect.

Hyde.—Houses (46), Back Bower estate; Vessey Bros., Marple.

Limehurst.—Permanent houses (50), Waterloo, Ashton-under-Lyne; A. Fisher, surveyor, Council Offices.

Lincoln.—Houses (116), Monks Tower estate; city engineer, Silver Street.

Macclesfield.—Houses (136), for R.D.C.; J. H. Walters, architect, 19, Moody Street, Congleton.

Middlesex. — Extensions, Harefield Hospital (£373,935); nurses' home extensions, Clare Hall Hospital (£11,060) and staff cottages (£15,900); and maternity block, Chase Farm Hospital (£12,906); county architect.

Musselburgh.—Buildings, including new power house (£60,000), for Inveresk Paper Co., Ltd.; J. W. Berriman, general manager.

Newport. — Houses (134), Alway Farm; borough architect, Town Hall.

Ramsbottom.—Houses (96), in pairs, for U.D.C.; surveyor, Council Offices.

Stirlingshire.—Crane gantry and works additions (£4,000), for R. Melville & Co., Ltd., St. John's Sawmills, Grahamston; manager.

Swindon.—Houses (100), Beech Avenue; borough engineer.

Tipton.—Works additions, Horseley Heath; Denbigh Engineering Co., Ltd.

Walsall.—Permanent prefabricated houses (150), Dudley's Fields; M. E. Habershon, borough engineer, The Council House.

West Ham.—Houses (127), between Rathbone Street and Forty Acre Lane; T. E. North, borough architect, 100, West Ham Lane, E.15.

West Lancashire.—Houses (34), for R.D.C.; R. Rosbotham, surveyor, 52, Derby Street, Ormskirk.

Wigan.—Extensions, Mining and Technical College, Library Street; Dr. J. F. S. Ross, principal.

Trade Publications

British General Mfg. Co. (1941), Ltd., 11, Charlotte Street, London, W.1.—Illustrated list (No. 1245) of future range of insulated accessories with separate price list of available items, including moulded lampholders, ceiling roses, adaptors and connectors, plugs and sockets, push-through switches, bells and pushes.

Transformer & Electrical Co., Ltd., Eastern Road, Walthamstow, London, E.17.—Illustrated catalogue of mains transformers, 15 VA to 3·5 kVA, layer wound and interleaved with earthing screen between primary and secondary windings on a bakelite bobbin in a metal frame; with tappings, fixing centres and cases to suit customers' requirements.

Frank Whitelegg, 90, Robinhood Lane, Sutton, Surrey.—List (GNB) illustrating wire forming and winding machines, revolution counters and accessories.

Hall & Pickles, Ltd., Port Street, Manchester, 1.—Handbook, bound and illustrated, containing tabulated data on the properties of "Kanthal" alloys (imported from Sweden) with formulæ and graphs for calculating industrial and domestic heating elements; electrodes for glowing plugs, oil burners and neon tubes; and traction starting and braking resistances made of this chromium-iron-aluminium-cobalt range of alloys.

C. E. Reed & Co., Ltd., Cart Lane, Victoria Street, Bristol, 1.—Illustrated and priced catalogue of electric hoists of different types.

Jenson & Nicholson, Ltd., 36, St. James's Street, London, S.W.1.—Leaflet on "solventless" impregnating varnish for all electrical purposes, being a synthetic substance that must be stoved at 300 deg F, but a catalyst is not needed for polymerization.

Alar, Ltd., 35, New Broad Street, London, E.C.2.—Individual data sheets on aluminium silicon casting alloys.

United Insulator Co., Ltd., Oakcroft Road, Tolworth, Surbiton,—An illustrated catalogue of mica, silvered-mica and ceramic capacitors for radio and electronic equipment as well as hermetic seals and metallized bushes.

Easco Electrical, 6, Brighton Terrace, London, S.W.9.—Priced and illustrated leaflet specifying type D.17 "Rect-Stat" 1 to 3 A charger for 6 and 12 V batteries.

Applicants for copies of these publications should write on their firms' business notepaper.

Northampton Electrical Association

AT a recent meeting of the Northampton and District Electrical Association, the following read short papers: Mr. O. F. Bailey ("Ultra Violet Light"); Mr. W. K. Allen ("Magnetic Fields"); Mr. H. L. C. Jennings ("The Electron Volt"); Mr. J. H. Farr ("Valve Rectification"); Mr. J. W. F. Goffe ("Magnetic Relays"); and Mr. W. G. Sharman ("Parallel Resonance").